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Origin & Development
OF THE
Edinburgh Medical School

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XI

MEDICINE AND SURGERY

Medical School to 1870—Progress of Surgery—Medical School since 1870

MEDICAL SCHOOL TO 1870

IN estimating the scientific progress of medicine in any locality or at any epoch, one would not be justified simply in enumerating the facts discovered or the theories advanced by individuals of a given period or school. Many important advances in the art of healing are applications of discoveries in quite other sciences, or have followed upon changed economic conditions, or are associated with the development of general culture and humanitarianism. In the progress of a medical school, therefore, one has to consider not merely the isolated discoveries of its workers, but its organisation, its teaching influence, and its effect upon the life and thought of mankind. Unlike the physical sciences, medicine can show few immediately complete discoveries. Even the idea of the circulation of the blood, which the popular mind attributes solely to Harvey, was initiated in the works of Galen, and Harvey's admirable demonstration omitted to show how the blood passed from the arteries to the veins. This essential part of the circuit was not demonstrated till after his death by Malpighi and Leeuwenhoek.

In the Edinburgh School of Medicine, if one excepts a few discoveries such as that of " fixed air " by Black, of the diverse functions of the nerve-roots by Bell, of the anæsthetic properties of chloroform by Simpson, of the properties of certain powerful drugs by Christison, and of the importance of antiseptic procedures by Lister, the influence of Edinburgh medicine has been of a steady constructive rather than of a revolutionary type.

Scotland possessed no mediæval School of Medicine, though in the presence of Michael Scot at Salerno and Bernard Gordon at Montpellier the capacity of Scotsmen as teachers was early recognised. Owing probably to the frequency and facility of intercourse between the East of Scotland and France the study of anatomy was early prosecuted in Edinburgh, certainly in the early years of the sixteenth century, and therefore before the renaissance of anatomy that began on the Continent with the publication of Vesalius's *Fabrica* in 1543. It was initiated by the Corporation of Surregianis and Barbouris, which must be regarded as a trade guild rather than a learned body. Some of its members rendered good service in war-time; and no doubt often passed overseas like Maister Peter Lowe of the West Country, who became a Doctor in Surgery of Paris and Surgeon to the King of France, and who, returning to his native country in 1597, founded the Faculty of Physicians and Surgeons in Glasgow. During the seventeenth century anatomy was regularly taught and entrants to the Corporation were regularly examined in this subject; while in 1705 a Professor of Anatomy, Robert Elliot, was appointed in the Town's College at a yearly salary of £15, "as an encouragement to young men to stay at home instead of travelling to foreign universities, which was attended by expenses and perils to youth."

During the seventeenth century Edinburgh had become a place of considerable social, political and literary importance; and though in the early part of the century it boasted no medical school beyond the anatomical instruction given to the barbers and surgeons, it possessed physicians of ability and distinction, who occupied moreover a respected social position.

The general practitioner of the seventeenth and eighteenth centuries in Scotland, as in England, was a Chirurgeon-Apothecary professing to heal wounds and cure diseases, making and selling drugs, operating with instruments often made by blacksmiths and much inferior to the fine steel instruments of the French surgeons. He bound himself for an apprenticeship of three years and received instruction from the master, whom he helped in practice, not being permitted to attend any lectures for the first two years. Probably the majority, unless they lived either in Edinburgh or Glasgow, never attended any lectures, and stood a very perfunctory examination before they were licensed to practise. The Book of Discipline presented to the Scottish Parliament in 1560 had proposed to institute in the University of St. Andrews, alone of the three Scottish Universities, a School of Medicine in which a reader should carry students through a course of five years, but the proposal fell into abeyance. In 1599 James VI gave a charter to the Faculty of Physicians and Surgeons at Glasgow, but this body existed for disciplinary purposes only; and the sole attempt in Scotland at public teaching of medical subjects before the late seventeenth century was that of the Corporation of Surgeons and Barbers in Edinburgh. The Edinburgh physicians had attempted to form a College in 1617, and in 1621 an order for its foundation had actually been granted by James VI, but the project being opposed was dropped for half a century. About 1670, however, the leading physicians of Edinburgh, moved by the desire to reform medicine, set themselves to lay out a physic garden and to obtain a charter for the institution of a College of Physicians. The men chiefly concerned in this movement were Sir Robert Sibbald, Sir Andrew Balfour, Dr Archibald Pitcairne, Sir Thomas Burnet and Sir Archibald Stevenson. As these men virtually began the Edinburgh Medical School, a few words ought to be said regarding each.

It should be remembered that at this period Sydenham was practising in London. Harvey's discovery had been published over forty years previously and was still disputed, though Borelli by his laborious mathematical investigations had developed its principles into the Iatro-mechanical School of Thought. Boyle, Mayow, Willis and kindred spirits of the Royal Society of London were studying various problems of life and disease. Malpighi and Leeuwenhoek were using the earliest microscopes to investigate the structure of the bodily fluids and tissues. Sylvius at Leyden was founding physiological chemistry and introducing the new idea of instruction in the wards of his hospital as a part of medical education.

Sir Robert Sibbald (1641–1722) more than any one else may justly be regarded as the founder of the Edinburgh Medical School. He had gone through a theological course in Edinburgh, and in 1660 proceeded to Leyden to study Medicine. Here he stayed a year and a half studying anatomy and surgery under Van Horne, botany under Vorstius, and the institutions and practice of medicine under the famous Sylvius. He says, "I frequented ane apothecaryes shop and saw the materia medica and the ordinary compositiones made. I studied chemie under a German called Wittichius, and after he went away, under Margravius, brother to him who wrott the naturall history of Brasile. Sometyme I heard the lessons of Van der Linden, who was famous for critical learning." Such was a medical course in the seventeenth century. Sibbald afterwards went for nine months to Paris, where he further studied botany, visited the Hôtel Dieu and the Hospital of the Charity, and then proceeded to Angers, where he obtained his diploma of Doctor of Medicine. He had a large and influential practice in the neighbourhood of Edinburgh, was appointed by Charles II Geographer Royal for Scotland, and left considerable literary remains, dealing especially with the natural history and archæology of Scotland.

Sir Andrew Balfour (1630–94) studied natural history and medicine at St. Andrews and later at Oxford, Paris, Montpellier, Padua and Caen, where he took the degree of M.D. in 1661. About 1676 he returned to Edinburgh to practise, and here he devoted himself chiefly to botany. Along with Sibbald he was responsible for the laying out of three physic gardens, which became an important activity of the city. The Town Council—recognising that the design of a physic garden would "prove exceedinglie profitable for the instruction of youth in that most necessary though hitherto much neglected pairt of the naturall historie and knowledge wherein the health of all persons whether it be for food, or medicin, is so nearlie concerned"—appointed Mr James Sutherland as overseer of the gardens under Sibbald and Balfour. Subsequently in 1676 Sutherland was made Professor of Botany, the first Professorship to be instituted in the coming Medical School. These physic gardens thus begun have not only proved a great source of commercial revenue in making Edinburgh one of the chief centres of the drug market, but have been of the highest importance to scientific botany. This, however, belongs to botany rather than to medicine.

Sir Archibald Stevenson was an Edinburgh physician intimately associated with Sibbald and Balfour in another important project, the foundation of the College of Physicians, for which a charter was obtained from Charles II by the mediation of the Duke of York in 1681. To this project both the Universities and the Bishops were at first hostile, but they were gradually won over to withdraw their opposition.

Dr Archibald Pitcairne (1652–1713) was perhaps the most celebrated Edinburgh physician of the time. Beginning the pursuit of Law he went to study in Paris, and there took to Medicine. From 1675 to 1680 he studied Medicine in that city, and in the latter year became M.D. of Rheims. On the inducement of his friend, David Gregory, Professor of Mathematics at Edinburgh, he devoted himself with great assiduity to mathematics, becoming later, like Borelli in Italy, one of the founders of the Iatro-mechanical or Iatro-mathematical school of thought. The system developed from Harvey's demonstration of the circulation ; for when the importance of this dynamic principle was grasped, in contradistinction to that of the leisurely ebb and flow of humours, its adherents attempted to prove that all the bodily activities, including those even of the nervous system and of digestion, were mere mechanical exercises. Although this idea could not persist for long, it formed for the century after Harvey a fruitful working hypothesis. Pitcairne threw himself into this controversy with zest, and his attitude is indicated by the title of an attack made on him by Sir Edward Eizat in *Apollo Mathematicus, or the Art of Curing Diseases by the Mathematics* (1695). Pitcairne was one of the original members of the Royal College of Physicians in 1681, and in 1685 he, Sir Robert Sibbald and Dr James Halket were made the first three Professors of Medicine in the Town's College, or, as it now began to be called, the University of Edinburgh. These Professors of Medicine were provided with lecture-rooms, but were unsalaried. Pitcairne's eminence as one of the protagonists of the Iatro-mathematical School procured for him in 1692 an invitation from the University of Leyden to assume the Chair of Medicine at that celebrated University, which he accepted. There he lectured till 1694, when he returned to Edinburgh for family reasons. The fact that the infant school of Edinburgh furnished a Professor to the old-established chair in Leyden must have given a great uplift to the former, still more the fact that Pitcairne had many men among his pupils who afterwards rose to fame, notably Mead and Boerhaave. Pitcairne's writings included numerous polemical pamphlets, poems, and dissertations on medical subjects, as, for example, on the *Quantity of the Blood*, the *Motion of the Stomach*, and especially a dissertation upon the *Cure of Fevers*. This was an important contribution to the medicine of that day, when fevers formed two-thirds of all diseases.

Sir Thomas Burnet (1632–1715) was another of the group who founded the College of Physicians. The son of an Edinburgh advocate prominent in the times of the Civil War, he was the brother of Bishop Gilbert Burnet, celebrated for his share in the revolt against James II, and for bringing over William of Orange. Thomas Burnet took his M.D. diploma at Montpellier in 1659, was physician to Charles II and to Queen Anne in Scotland, and was celebrated all over Europe for his highly popular compendium of medicine, the *Thesaurus Medicinae* (1673).

An important early activity of the developing medical school was the issue of an official Edinburgh Pharmacopœia by the College of Physicians in 1699. The first pharmacopœia to appear had been that of London in 1618, and for the simplicity of its preparations and comparative absence of "dreck-apoteke" that of Edinburgh compares very favourably with the current London edition.

Such, then, were the beginnings of the Royal College of Physicians and of the Medical School at Edinburgh, which came into being not by fortuitous influences, but through determined organisation by a group of unusually capable men. By the year 1700 there were Professors of Botany and of Medicine, a Physic Garden and lectures of a kind upon Anatomy, these being, as we have seen, the necessary elements for a medical degree. The importance that chemistry had attained in the hands of Sylvius and others on the Continent was further recognised by the appointment of Dr Crawford as Professor of this subject in 1713.

This medical school was not effective for attracting or dealing with any large number of students, and in 1720 Alexander Monro was appointed Professor of Anatomy; this being followed very soon (1726) by the appointment of Andrew St. Clair and John Rutherford as Professors of Medicine and Institutes of Medicine, Andrew Plummer and John Innes as Professors of Chemistry and Joseph Gibson as Professor of Midwifery. These had been pupils of the celebrated Boerhaave in Leyden. The steady growth of the School is shown by the number of students attending the class of anatomy, which rose from 57 in 1720 to 83 in 1730, 130 in 1740, 158 in 1750, 342 in 1790 and over 800 in 1807. As will be pointed out later, from this time Edinburgh became distinguished as a centre for anatomical research and teaching, second only to the position into which London was raised by the brothers Hunter and their followers.

Another celebrated teacher, distinguished also for his work as a neurologist, was Robert Whytt, who acted as Professor of Medicine from 1747 to 1766. In his earlier days Whytt had published a treatise upon the cure of stone in the bladder, then a very important disease. In 1751 appeared his work, *On the Vital and Other Involuntary Motions of Animals*, which attracted the attention of physiologists all over Europe and provoked a controversy with the great hierarch of physiology, Haller. In this book Whytt for the first time drew attention to the importance of the sympathetic nervous system, and threw aside the doctrine of Stahl that the rational soul is the cause of all involuntary motions in animals, ascribing such movements to "the effect of a stimulus acting on an unconscious sentient principle." His greatest work, *On Nervous, Hypochondriac, or Hysteric Diseases, to which are Prefixed some Remarks on the Sympathy of the Nerves*, appeared in 1764, and was shortly after translated into French. Whytt also published several essays on physiological and clinical subjects, of which his *Observations on Dropsy of the Brain* gives the earliest account of tuberculous meningitis.

He was succeeded in the Chair of Institutes of Medicine in 1766 by William Cullen, an eminent teacher and consultant who did for the developing Edinburgh School what Boerhaave had done for Leyden. Cullen had studied in Glasgow, practised for a time in Hamilton, where he had William Hunter for a pupil, and subsequently moved to Glasgow, where he lectured upon Medicine and other subjects, and had Joseph Black as a pupil. These two men remained his devoted friends through life. In 1755 he was elected Professor of Chemistry in Edinburgh, a chair in which ten years later he was succeeded by Black. Fortunately Cullen, like his predecessors, was highly successful as a clinical lecturer, and for many years (1773–90), while he held the Chair of Practice of Medicine, he was the mainstay of the Edinburgh School. He took an active part in preparing the new edition of the *Edinburgh Pharmacopœia*, issued in 1774, and in obtaining a new hall for the College of Physicians. In 1783 his persevering exertions secured the incorporation of the Philosophical Society as the Royal Society of Edinburgh. He was not distinguished as an anatomist or physiologist or as an observer of clinical facts. The influence he exerted on the public mind and the great attraction that he exercised in bringing students from a distance were due to his clearness of perception, sound reasoning and judgement more than to any originality. As a lecturer he had powers of interesting his students and inspiring them with enthusiasm. One of his pupils highly commends his excellent arrangement, his memory of facts, and the ease, vivacity, variety and force of his lectures. He lived at a time when medical science had been enriched by many as yet unrelated facts, and when medical practice was driven hither and thither by conflicting theories and systems. These his clear mind and power of expression enabled him to codify and set in their proper places. His principal published works were the *First Lines on the Practice of Physic* and his *Nosology* (1769). The latter aimed at a rigid classification of diseases by their symptoms on the same principle as Linnæus had (1735–53) adopted for classifying plants. It arranges all diseases by classes, orders, genera and species, and regarding them as fixed entities makes in a sense a system of the whole of medicine. Although at the present day diseases are arranged on a causal system, and Cullen's classification is forgotten, it undoubtedly greatly simplified medicine and established his reputation during his lifetime and for half a century afterwards.

The friendship that subsisted between Cullen and his pupil, Joseph Black, has been mentioned ; and Black's career and work are detailed in the section on Chemistry.

Another pupil of Cullen, named John Brown, should be mentioned in connection with the so-called "Brunonian System," not because this made any real addition to medical science, but because it illustrates a frequently recurring phase of medical opinion and one which in its time obtained a great number of adherents. Brown, acceding to the ever-present demand for some system in medicine according to which definite remedies may be applied to definite symptoms, revived the old Asklepiadean methodism of the Roman Empire ; which had shortly before been adopted by Hoffmann of Halle. Diseases are, according to the Brunonian System, to be classified as "sthenic" or "asthenic," according as the vital condition of "excitement" is increased or diminished, and the tissues constricted or relaxed. Treatment is to be administered by depressing drugs in the one case and by stimulation in the other. This theory, so simple and so complete as far as it went, not only obtained many adherents among the students in Edinburgh, but gained a firm footing in some of the universities of Germany and Italy till as late as the early part of the nineteenth century.

Cullen was succeeded in the Chair of Practice of Medicine by James Gregory, who was brilliant and witty as a teacher, and one of the great polemic writers of his day, but who added nothing to medical knowledge or practice beyond giving his name to a favourite domestic stomachic, the powder composed of magnesia, rhubarb and ginger. As Edinburgh had been since Cullen's time the chief medical school of fame and resort in Britain, students flocked to it from all parts of the British Isles and the Colonies, so that these became flooded with practitioners who carried out Gregory's doctrines of free blood-letting, cold affusions, brisk purging, frequent blistering and the use of tartar emetic.

A more important figure in medical history was Andrew Duncan, Senior (1744–1828), who as an extra-academical lecturer on Medicine founded a dispensary for the treatment of the poor, which was later incorporated as the Royal Public Dispensary. He also in 1773 commenced the publication of a periodical named *Medical and Philosophical Commentaries*, a quarterly journal of medicine issued by a Society of which he was secretary ; later the publication was entitled *Annals of Medicine* ; and in 1804 it merged into the *Edinburgh Medical and Surgical Journal*, edited by his son, Andrew Duncan, Junior. This periodical has survived to the present day as the organ of the Edinburgh Medical School under the title of the *Edinburgh Medical Journal.*

In 1792 Andrew Duncan, being now Professor of the Institutes of Medicine, proposed the erection of a public lunatic asylum in Edinburgh. It is important to note that this proposal was made some nine years before the appearance of Pinel's *Traité medico-philosophique sur l'alientation mentale* (1801), which is generally regarded as the first step in the direction of humane treatment for this unfortunate class of sufferers. Duncan had been led to his suggestion after hearing of the miserable death of Robert Fergusson, the poet, while insane, in the common workhouse in 1774. After many difficulties had been surmounted, the project was at last accomplished. A Royal Charter was obtained in 1807, together with a grant of £2000 by Government from the forfeited Highland estates, and by these means a lunatic asylum was built on modern humane lines at Morningside. Duncan also founded and was the first President of the Edinburgh Medico-Chirurgical Society in 1821. Apart from his public activities, Duncan wrote largely, his best known works being

Elements of Therapeutics, *Medical Cases* and *The New Dispensatory*.

Andrew Duncan, Junior, in 1803 brought out the *Edinburgh New Dispensatory*, which went through ten editions, was translated into French and German, and was extensively used in the United States. In 1807 he was appointed to the newly created Chair of Medical Jurisprudence, but attendance on this subject was not at that time made compulsory for students, though in the Commission creating the Professorship it was stated that the subject was "taught in every University of reputation on the continent of Europe."

The Duncans, father and son, were succeeded in the Chair of the Institutes of Medicine by William Pulteney Alison, who later became Professor of Medicine in 1842. Alison was brother of Sir Archibald Alison, the eminent historian of Europe. His reports of the New Town Dispensary (1817–19) were important contributions to the knowledge of fevers, and especially are of value in showing the modification of smallpox caused by vaccination which at that time was a novel method of treatment. He published the substance of his physiological lectures in *Outlines of Physiology* (1831), and in his teaching of this subject he postulated the existence of "vital forces" inherent in living tissues; vital contraction he held to be a property of certain tissues; while vital attraction was shown in every part of the organism, at every moment of nutritive, secretive and absorbent change. Alison explained inflammation and other phenomena of disease in the same way. These matters are dealt with in many of his writings, but modern thought has drifted away from his standpoint, which appears to be little relevant to vital phenomena as now conceived. Of much greater importance than Alison's medico-philosophic writings were his practical activities and treatises. The latter were all concerned in one way or another with the amelioration of the Scottish poor. From the beginning of his medical experience Alison had been deeply impressed with the manner in which poverty and unfavourable social conditions assist in the spread of disease. This was brought out in his *Observations on the Management of the Poor in Scotland, and its Effects on the Health of the Great Towns* (1840). After prolonged agitation a Royal Commission of inquiry was appointed in 1844, and an Act was passed in 1845 embodying most of what Alison had striven for. His work was not only of great value to the poorer classes of his time, but was an important precursor of much of the social legislation at the present day.

It should be remembered that in the Edinburgh Medical School there has been from the beginning a solid body of teaching, practice and research, outside and independent of the University. As we have seen, Sibbald, Balfour and their associates in the late seventeenth century had laid out physic gardens, given instruction in Medicine, and published medical treatises before the Town's College assumed them as Professors; the same applies to the teachers of Anatomy in the Surgeon's Corporation, of whom Eliot, Drummond and M'Gill were, in the early years of the eighteenth century, taken over as Professors of Anatomy in the Town's College. This Extra-Mural School did not give place to the University, but continued to increase in numbers and in activity as the Town's College developed into the University of Edinburgh. Most of the medical Professors in the latter have been chosen from among this body of teachers, and it has been the policy of the University to recognise the lecture courses of these teachers as soon as they were licensed by the College of Physicians or of Surgeons, as the case might be. This large body of teachers has steadily augmented the sum of medical knowledge.

The relationships of the Academical and Extra-Academical Schools are well illustrated in the development of the science of Anatomy, to which some detailed reference may now be made. As already pointed out, the early days of anatomical teaching in Edinburgh go back to 1505. Among the anatomists of the seventeenth century were James Borthwick, Robert Eliot, Alexander Menteith and Archibald Pitcairne. Robert Eliot in 1705 was made the first Professor of Anatomy in the Town's College, and in 1708 Adam Drummond was conjoined with him in office. On the death of Eliot in 1716, John M'Gill was conjoined with Drummond till 1720, when both, being occupied with other business, resigned in favour of Alexander Monro.

Alexander Monro *primus* (1697–1767) had been brought up by his father, John Monro, an old Army Surgeon and recent member of the new College of Physicians, with the view of teaching anatomy in Edinburgh. Returning to Edinburgh, after studying Anatomy under Cheselden in London, and Medicine in Paris and at Leyden under Boerhaave, he was appointed, in 1720, Professor of Anatomy in the Town's College. Along with Lord Provost Drummond he was instrumental in founding the Royal Infirmary, opened in 1729 and rebuilt in 1741. Here he, along with Rutherford, introduced the methods of bedside teaching and of giving clinical lectures they had learned at Leyden, and he was for many years the most important professor in the developing medical school. His chief work was a treatise on *Osteology*, which went through several editions, and he published some fifty papers on minor subjects of Anatomy, Surgery and Medicine.

His son, Alexander Monro *secundus* (1733–1817), was both more popular as a lecturer and more distinguished for his publications than the father. Brought up with the idea of succeeding to the Anatomical Chair, he was educated under William Hunter in London; and later at Paris, Leyden and Berlin. He was one of the earliest (1758) to describe the general communications of the lymphatic system; and in 1783 he published his important treatise on the *Structure and Functions of the Nervous System*. In this work occurs his description of the communication between the lateral ventricles, through the name of which, "foramen of Monro," he is known to every medical student; he had observed it in a case of dropsy of the ventricles, where it was greatly distended. In 1788 he published his observations on the *Bursae Mucosae of the Human Body*, the first full description of these cavities. He was also greatly interested in the action of drugs, as shown by his *Experiments on the Nervous System with Opium and Metalline Substances* (1793); and he devoted much attention to comparative anatomy, as evidenced by his *Structure and Physiology of Fishes explained and compared with those of Man and other Animals* (1785), a branch of Anatomy which later attracted a great deal of attention in Edinburgh. His last book, *Three Treatises on the Brain, the Eye and the Ear*, appeared in 1797.

His son, Alexander Monro *tertius* (1773–1859), continued the tenure by the Monro family of the Anatomical Chair at Edinburgh through a period of one hundred and twenty-six years. Many distinguished men were his pupils, though during his tenure of office it was the practice of the students to pay the fee of his class but obtain their instruction from the more popular extra-academical teachers. A number of writings on anatomical and other subjects issued from his pen, but none was of any permanent value.

Monro *secundus* had been not only a popular and successful teacher of Anatomy, but he enjoyed a great private practice as consulting physician, more lucrative probably than that of his contemporary Cullen. As he did not practise surgery, though he gave lectures on this subject, he left a good field for the extra-academical surgeons. These, and especially the brothers John and Charles Bell, saw the great importance to the surgeon of a practical training in Anatomy, and soon began to invade the latter subject. Together these brothers dissected, taught, and published between 1793 and 1802 their *Anatomy of the Human Body*, which went through numerous editions. In 1794 John Bell brought out his *Engravings of the Bones, Muscles and Joints*, drawn and engraved by himself. Charles Bell assisted in teaching his brother's anatomical class, and the two brothers virtually created the subject of surgical anatomy. Charles Bell's fame rests chiefly on physiological researches, which place him on equality with Harvey. It is somewhat difficult to separate the work done in his Edinburgh periods from that done while he was in London. He was born and lived in Edinburgh till 1804, when, at the age of thirty, he went to London, whence he returned to become Professor of Surgery at Edinburgh in 1836. Before he left Edinburgh he had been at work on the nervous system and on the arteries, and, as already stated, in 1804 he published the account of the nervous system and special senses in the *Anatomy of the Human Body*, written by himself and his brother John Bell. Most of his celebrated *Anatomy of Expression* also belongs to this period. Both of the brothers, by the way, were expert draughtsmen, like another Edinburgh physiologist, Allen Thomson (1809–84), whose sketches may still be seen illustrating present-day text-books. While in London Charles Bell, in 1811, published privately his *New Idea of the Anatomy of the Brain, submitted for the Observations of his Friends by Charles Bell, F.R.S.E.* It contained the first description of the varying function in the anterior and posterior nerve roots. . . . "I found that injury done to the anterior portion of the spinal marrow, convulsed the animal more certainly than injury done to the posterior portion ; but I found it difficult to make the experiment without injuring both portions. . . . On laying bare the roots of the spinal nerves, I found that I could cut across the posterior fasciculus of nerves, which took its origin from the posterior portion of the spinal marrow, without convulsing the muscles of the back ; but that on touching the anterior fasciculus with the point of the knife, the muscles of the back were immediately convulsed."

It will be observed that Bell does not definitely specify the function of the posterior roots, which he believed to be connected with the cerebellum. This was discovered by Magendie in 1822, eleven years after Bell's publication of the nature of the anterior roots. On his return to Edinburgh in 1836, Bell published his *Nervous System of the Human Body*, in which he describes his famous researches on the nerves of the face and respiration, and gives the first account of the effects produced by paralysis of the seventh nerve (Bell's palsy) as follows :

" It appears that whenever the action of any of the muscles of the face is associated with the act of breathing, it is performed through the operation of this respiratory nerve, or *portio dura*. I cut a tumour from before the ear of a coachman. A branch of the nerve which goes to the angle of the mouth was divided. Some time after he returned to thank me for ridding him of a formidable disease, but complained that he could not whistle to his horses."

Another of the celebrated extra-academical teachers of Anatomy during the Monro regime, was Dr Barclay, who first studied Divinity, and taking up Medicine later, was, from 1797 to 1825, a successful teacher of Anatomy. He was a talented comparative anatomist, and left a valuable museum of human and comparative anatomy, as well as numerous treatises. Among the latter were *A New Anatomical Nomenclature*, *The Muscular Motions of the Human Body*, *The Arteries of the Human Body*, *An Inquiry concerning Life and Organisation*. For eleven years of Barclay's time as a teacher (1806–19) a rival teacher to him and the Monros was Dr John Gordon, who published several works, of which the best known was a treatise written in opposition to the phrenologists Gall and Spurzheim, entitled *The Structure of the Brain, comprising an Estimate of the Claims of Drs Gall and Spurzheim to Discovery in the Anatomy of that Organ*. John Innes and Andrew Fyfe, who acted successively as demonstrators to Monro *secundus*, were well-known as authors of successful text-books on Anatomy.

During the later years of tenure of the Chair by Monro *tertius*, the number of medical students matriculating in the University sank to little more than one-third of what it had been when he succeeded to the professorship, and in this period a large number of teachers appeared, such as Cullen, Aitkin, Lizars, Liston, Syme, Knox. All of these, however, with the exception of Knox, treated Anatomy more as a stepping-stone to operative surgery, and with them we have no concern here.

Robert Knox (1791–1862) succeeded Barclay as a lecturer on Anatomy in 1825, and was so popular a lecturer that his class in a few years numbered over five hundred students. He had the misfortune to be involved by the murders of Burke and Hare. Though he was exonerated from knowledge of their culpability, unpopularity fastened upon him, which gradually proved his ruin. Apart from his brilliance as a lecturer, he was known in his lifetime for several anatomical and ethnographical works, *e.g.*, *The Edinburgh Dissector*, *The Races of Men*, *A Manual of Artistic Anatomy*, *A Manual of Human Anatomy*, etc., but none of these is of any great permanent value.

Other extra-academical lecturers of a slightly later period were Dr Sharpey, who lectured on Anatomy from 1832 to 1836, and who, during his Edinburgh period, discovered the "cilia" possessed by some mucous membranes. Allen Thomson, another extra-academical lecturer on Anatomy along with Sharpey, and Dr Martin Barry were two of the earliest inquirers with the help of the microscope into the mysteries of the developing ovum, and many fundamental discoveries in embryology were made by them.

The Edinburgh School played a notable part in the great movement of the first half of the nineteenth century, which resulted in the recognition of the cell as the morphological unit in vital processes. This it did through the work of John Goodsir. Goodsir (1814–67) acted first as Curator of the College of Surgeons' Museum, then in a similar capacity to the University, and finally as Professor of Anatomy from 1846 to 1867. In his early days, like others of the time, he was interested in parasitology, and the sarcina ventriculi and the fungus responsible for potato blight were two of his discoveries. About the period 1842–45 he published a number of papers dealing with the activities of the cell. Up to this time it was generally accepted that new cells were developed by a process of precipitation of granules in a fluid exudate. Goodsir, on the contrary, not only advocated the importance of the cell as a centre of nutrition, but considered that the organism was divided up into territories of cells presided over by one central cell. Virchow recognised his indebtedness to Goodsir by dedicating to him his *Cellular Pathologie* (1858), in which he calls Goodsir " one of the most acute observers of cell-life." These cellular doctrines are to be found in Goodsir's *Centres of Nutrition, Absorption and Ulceration, Ulceration in Articular Cartilages, Secreting Structures, Diseased Conditions of the Intestinal Glands*, etc. His treatises on natural history subjects were numerous, as were also those on Morphological and Teleological Anatomy, such, for example, as that *On the Mechanism of the Knee-Joint, On the Morphological Constitution of Limbs*, etc.

To Goodsir's time belongs another distinguished representative of the extramural school who subsequently became Professor of the Institutes of Medicine in the University (1848)—John Hughes Bennett (1812–75). He taught Physiology and Medicine for over a quarter of a century, published a text-book on Medicine which was widely read, but the chief scientific achievements associated with his name are his original description of the disease leucocythæmia, and the great change to which his investigations led in the current treatment of pneumonia. Leucocythæmia was the first disease of the blood to be described (1845), and its recognition opened up an entirely new branch of Medicine (Addison described pernicious anæmia four years later in 1849).

The question of priority in discovery of leucocythæmia is sometimes debated, for, like other discoveries in medicine, it was made simultaneously by different men, three cases of leucocythæmia being independently recorded for the first time in the year 1845. Hughes Bennett's history of the matter, given in his treatise on Leucocythæmia of 1852, shows that the credit of priority belongs to him.

Bennett's treatise on *The Restorative Treatment of Pneumonia*, published in 1865 when he was Professor of the Institutes of Medicine, belongs to a type of medical research much more difficult to appraise. The practice of bleeding had come down from the eighteenth century as a moderate method, and had been developed by the French School of Broussais, by Gregory of Edinburgh and others into a powerful weakening or "antiphlogistic" regime which was supposed to be requisite in order to abort the fever. Hughes Bennett's treatise is a masterly survey of different methods then in vogue for treating pneumonia, which he compares by means of the statistical plan of Louis. By showing that the method of profuse bleeding was followed by death in one case out of three, while of one hundred and twenty-nine cases treated by him on the "restorative" principle only four had died, he did more than any one else to banish excessive bleeding as a routine method of treatment.

We may now consider some of the other outstanding figures in the Edinburgh Medical School of the middle period of the nineteenth century.

Sir James Young Simpson (1811–70), who became Professor of Midwifery at Edinburgh in 1840, made many contributions to extend and improve that branch especially. He introduced the uterine sound (1843), iron wire sutures (1858), the long obstetric forceps and other instruments, acupressure (1860), the practice of version for certain varieties of deformed pelvis. He also made valuable contributions to medical literature on such subjects as hermaphroditism and leprosy in

Scotland, but his name is especially associated with the introduction of chloroform into obstetric practice, and indeed with fighting the battle against prejudice for the use of anæsthetics generally in Britain. Since the steps by which ether and chloroform were introduced into obstetrics, prior to their adoption for surgery, are not generally known, it is of interest to set them down here in Simpson's own words.

"If we try to put into a summarised form the data which we have been discussing regarding the introduction of anæsthesia in America and this country, it appears to me that we might correctly state the whole matter as follows:

"1. That on the 11th December 1844 Dr Wells had at Hartford, by his own desire and suggestion, one of his upper molar teeth extracted without any pain, in consequence of his having deeply breathed nitrous oxide gas for the purpose, as suggested nearly half a century before by Sir Humphry Davy.

"2. That after having with others proved, in a limited series of cases, the anæsthetic powers of nitrous oxide gas, Dr Wells proceeded to Boston to lay his discovery before the Medical School and Hospital there, but was unsuccessful in the single attempt which he made, in consequence of the gas-bag being removed too soon, and that he was hooted away by his audience, as if the whole matter were an imposition, and was totally discouraged.

"3. That Dr Wells's former pupil and partner, Dr Morton of Boston, was present with Dr Wells when he made his experiments there.

"4. That on the 30th September 1846 Dr Morton extracted a tooth without any pain, whilst the patient was breathing sulphuric ether, this fact and discovery of itself making a NEW ERA in anæsthetics and in surgery.

"5. That within a few weeks the vapour of sulphuric ether was tried in a number of instances of surgical operations in Boston—Dr Morton being generally the administrator—and ether vapour was established as a successful anæsthetic in dentistry and surgery.

"6. That in January, and the subsequent spring months, 1847, the application of sulphuric ether as an anæsthetic in midwifery was introduced, described in our medical journals, and fully established in Edinburgh, before any case with it was tried in Boston or America.

"7. That on the 15th November 1847 the anæsthetic effects of chloroform were discovered in Edinburgh, and that it swiftly superseded in Scotland and elsewhere the use of sulphuric ether, and extended rapidly and greatly the practice of anæsthesia in surgery, midwifery, etc."

In 1816 the Hanoverian Sertürner had discovered the alkaline base "morphium" in opium, and in April 1831 Dr William Gregory, afterwards Professor of Chemistry, published in the *Edinburgh Medical and Surgical Journal* his valuable discovery of the preparation of hydrochlorate of morphia without the use of alcohol or any other solvent than water. Morphia, till then used in the form of acetate, had made little progress in Britain, because too expensive, and probably also by no means always pure. But Gregory's process supplied a soporific dose of morphia at no greater cost than the equivalent dose of laudanum, and in a state of great purity. As is well known, the hydrochlorate and the subsequently prepared sulphate of morphia have largely superseded in use the other purified galenical preparations of opium. As a development of this discovery, Edinburgh has become the chief commercial centre in the United Kingdom for the manufacture of the active alkaloidal principles derived from numerous plants. William Gregory belonged to a family of which many representatives practised or held professorial chairs in Edinburgh, of whom James Gregory has already been mentioned. The first of the succession was James Gregory, the mathematician (see page 5).

William Gregory's work was not only intrinsically important, but it is noteworthy in that another of the great nineteenth-century personalities of the Edinburgh School was associated with its development. This was Dr (afterwards Sir) Robert Christison (1797–1882), from 1822 to 1832 Professor of Medical Jurisprudence, and from 1832 to 1877 Professor of Materia Medica. In Medical Jurisprudence his investigations on bruising of the living body, conducted with reference to the trial of Burke and Hare, and on burns sustained before and after death, belong to the classics of this subject. In the case of bruising, his experiments, which showed that bruises cannot be inflicted after death, formed the crucial point for the conviction of the murderers in this case. In toxicology, his work on the effects of oxalic acid, on the action of water on lead, and on cases of arsenic poisoning, were of great value. Christison had spent a period of his early life in study, mainly chemical, at Paris, where Magendie was then introducing the subject of experimental pharmacology and Orfila was busy with toxicology. His partiality to chemical and toxicological science is shown in the *Dispensatory*, which he published in 1842; this was founded to some extent upon the Dispensatory of his predecessor in the Chair of Materia Medica, Andrew Duncan, and constituted a kind of commentary upon the pharmacopœias of Edinburgh and other places, containing also records of Christison's own experiments and observations. This work prepared the way for the first Pharmacopœia of Great Britain and Ireland, issued in 1864 by a Committee of the General Medical Council, of which Christison acted as Chairman. Among his best known pharmacological discoveries were that of conine, the active principle of hemlock (1836), of the action of Calabar bean (1855) and of the therapeutic uses of digitaline (1855); for though he did not originally isolate this active principle, he was the first in this country to point out its valuable properties, especially as a diuretic. Christison's work on the action of conine is interesting as being one of the earliest pharmacological experiments to be done in this country. He showed that it acted by abolishing the functions of the spinal cord, the action being "the counterpart of the action of nux vomica and its alkaloid strychnia." Other active drugs investigated by Christison were Calabar bean, coca leaves, and especially the effects and properties of opium from various sources and of different kinds of wine.

An important advance in the knowledge of nervous and psychic disorders was made by Thomas Laycock, Professor of Medicine from 1855 to 1876. His *Treatise on the Nervous Diseases of Women* (1840) had been one of the first contributions (preceding Charcot) to the modern view of hysteria. In 1844, in a paper read before the British Association at York, he had formulated the theory of reflex action of the brain by which he accounted for the phenomena of delirium, dreams and somnambulism. His *Mind and Brain* (1859) prepared the way for the study of unconscious cerebration, to which he afterwards chiefly devoted himself, and in which he described mental phenomena that have received due recognition only in the last few years in connection with the great numbers of nervous cases arising out of the War.

In concluding this notice mention may be made of a minor though far-reaching contribution by a member of the Edinburgh School to practical medicine. Alexander Wood, an extramural lecturer on Medicine at Edinburgh, was the first in Britain to use the hypodermic syringe, though priority of discovery cannot be claimed for him, since Pravaz had already used this form of medication in 1851 and published a description of his syringe in 1853. The idea of administering morphia hypodermically for the relief of pain appears to have occurred independently in 1853 to Wood, who constructed a small syringe on the plan of the "sting of a bee," for this purpose. Subsequently he extended its application to the administration of atropine and other substances in his *New Method of Treating Neuralgia* *by Subcutaneous Injection* (1855). He enjoys at all events the merit of having been the first to introduce this now universal method in Great Britain.

J. D. C.

SURGERY

It may be that Modern Surgery is more properly placed among the Arts than among the Sciences, but, even as a craft, its progress must ever depend upon the soundness of the scientific principles upon which its practice is based. From the time it began to emerge from its purely empirical stage, every real advance of Surgery as an applied art has been directly traceable to some permanent addition made to exact knowledge. Technical skill and manipulative dexterity have doubtless counted for much, but even in periods when these talents were most highly developed, progress has been arrested for want of light that could only be obtained through scientific inquiry. Advances in scientific knowledge are not the product of any separate school of thought, their practical applications cannot be confined within the walls of any seat of learning, nor can any individual claim the sole credit for a forward step. If the surgeons of Edinburgh can claim to have advanced their calling along scientific lines, it is only because they have worked upon the common body of knowledge; some by revealing new facts, some by discerning the bearing of facts revealed by others, and some by giving these their practical application.

The intimate association between Surgery and Anatomy is traditional in Edinburgh; indeed, the very foundation of the School may be traced to the steps that were taken by the early surgeons to ensure that their practice should be based upon an accurate knowledge of the structure of the human body. As far back as 1505, before the fathers of Anatomy, Vesalius and Fallopius, were born, and before the divines had met at Salamanca "to determine if it were consistent with conscience to dissect a human body for the purposes of science," the Corporation of "Chirurgeanes and Barbouris" of Edinburgh petitioned the Town Council "that we may have anis in the yeir ane condampnit man after he be deid, to mak antomea of, quairthrow we may heif experience, Ilk ane to instruct utheris, And we sall do suffrage for the soule." This they did on the ground that "every man aucht to knaw the nature and substance of every thing thatt he wirkis or ellis he is negligent."

The granting of this petition by the Provost and Council in 1505 was the earliest of the many enlightened acts that have characterised the policy of our city fathers in relation to medical education, and the first tie in the close bond of union that exists between Town and Gown in our city to-day.

When the Town Council granted them their "Seal of Cause," the Surgeons were combined with the Barbers in a single corporation, and the interests of the two sections frequently clashed. The provision of anatomical material stimulated the surgeons to improve their knowledge and skill, so that they came to "knaw all the vaynis in manis bodie" and were thus able to "mak flewbothomea in dew tyme." The duties proper to the barber were "to clip, cow, and shave the lieges," and to these the surgeons vainly sought to confine them. The attempts to define the respective spheres of activity of the two crafts led to much friction, until finally they were separated by a decree of the Lords of Session in 1722.

Meanwhile the body of a single malefactor in the year failed to meet the needs of the growing School of Anatomy, and the Town Council made a further grant of "these bodies that dye in the correction-house" and "the bodies of fundlings that dye upon the breast . . . for the encouragement of so necessary a work as the improving of Anatomy." Later, yet another demand was made, for "the bodies of fundlings who die betwixt the time that they are weaned and their being put to schools or trades; also the dead bodies of such as are stiflet in the birth; which are exposed and have none to owne them; also the dead bodies of such as are *felo de se*, and likewise such as are put to death by sentence of the magistrat, and have none to owne them."

In granting this last request the Town Council made it conditional on the Corporation building an anatomical theatre and publicly holding in it once a year "ane anatomical dissection as much as can be showen upon one body." The first public dissection, which took place in 1703, marks a step forward in the development of the surgeons' anatomical school. No longer was Anatomy to be a purely technical branch of study designed merely to improve the craftsmanship of the surgeons and their apprentices; it was now to become a subject of general education. The records that have come down to us do not show to what extent the people of Edinburgh embraced the opportunities thus afforded them of studying anthropology, but there is satisfactory evidence that the standard of surgical practice was raised, and in this way the public derived benefit.

For two hundred years the surgeons continued to utilise their anatomical material in accordance with the condition on which it had originally been granted them—"ilk ane to instruct utheris,"—but in 1705 the teaching of Anatomy was placed in the hands of one man, when the Incorporation selected Robert Eliot to instruct their apprentices and servants; and the Town Council, who confirmed this appointment, made Eliot Professor in the Town's College at an annual salary of fifteen pounds. Adam Drummond, John M'Gill, and Alexander Monro *primus* were successively selected by the surgeons to fill the Chair of Anatomy, and were accepted by the Town Council.

It cannot be claimed that, prior to the advent of the first Monro, members of the Edinburgh School had made any outstanding contributions to anatomical science; but by disseminating such knowledge as was then current, and by encouraging the study of the subject among their pupils, they helped to lay a sound scientific foundation for the development of a School of Surgery.

The time for this was ripe, and the men were ready, but circumstances conspired to delay its fulfilment. The very success with which the surgeons had nurtured the School of Anatomy for two centuries proved their own undoing. It came about in this way. After Alexander Monro had been the Professor of Anatomy at Surgeon's Square for five years, a rumour got abroad that the graves in the city churchyards were being desecrated to provide anatomical material, and, to avoid the vengeance of the mob, Monro moved himself and his valuable collection of preparations to the more secure keeping of the University. Soon after this (1726) a Medical Faculty was founded within the University, and Monro was appointed Professor of Anatomy, with the additional duty of teaching Surgery. But Monro being no surgeon, his teaching of the subject was perfunctory, and his brilliant talents were entirely devoted to his anatomical work. After filling the Chair for thirty-eight years, he was succeeded by his son Alexander *secundus* (an even more distinguished anatomist), on similar terms, and with results even less satisfactory to Surgery, for he not only failed to teach the subject himself, but for fifty-four years successfully opposed the establishment of a Professorship of Surgery within the University.

The third of the Monro dynasty in time succeeded his father, and delivered the official course of surgical instruction within the University, while outside he practised as a physician. Thus did the official teaching of Surgery remain in thraldom to Anatomy for a hundred and ten years. But even the surgeons are free to remember with gratitude and pride the lustre which the anatomical work of the Monros shed upon the Edinburgh School.

Surgery did not, however, stand still in Edinburgh throughout the long reign of the Monros. During the second half of the eighteenth century the stimulus given to surgical progress by Petit, Chopart, Desault and other leaders of the French School roused the younger surgeons of Edinburgh, and some were attracted to Paris to study under these masters. Among them was Benjamin Bell (1749–1806), the first of a long succession of Bells who worthily upheld the traditions of Surgery in Edinburgh from 1770 till 1911, when Joseph Bell, the last of the race, died. Benjamin Bell is looked upon as the "father of the surgical school," and in his lifetime he exerted a considerable influence on the progress of his art. He published between 1783 and 1788 the first *System of Surgery* in the English language: it went through seven editions, was translated into French and German, and was for long the standard English work on Surgery. An accurate observer of clinical phenomena, with an alert and speculative mind, he was in many respects singularly in advance of his times, and if he did not anticipate he at least had glimmerings of some of the great ideas of later days. He advocated the use of measures to diminish the pain of surgical operations; he recognised the danger of admitting air to the contents of abscesses and other collections of matter and devised means of preventing it; he employed systematic rubbing of limbs to prevent as well as to cure stiffness in muscles and joints with all the zeal of a modern masseur; and he introduced new principles in performing amputation of limbs. His most important scientific contribution to Surgery was his demonstration that gonorrhœa and syphilis are separate diseases, and in maintaining this thesis he had to contend with no less an authority than John Hunter.

But for a domestic quarrel between the College of Surgeons and the Managers of the Royal Infirmary, Benjamin Bell's place as the leading surgeon in Edinburgh would have been seriously challenged by his contemporary, of the same surname but of a different family—John Bell (1763–1820), one of the protagonists in a famous battle of words that agitated the academic world of Edinburgh during the first decade of the nineteenth century. In the Extramural School, assisted by his more famous brother, Charles, he pursued the study of Anatomy, largely from the point of view of an applied science, and is generally looked upon as the pioneer of "surgical anatomy." His work on the "anastomosing arteries" and the development of a collateral circulation after ligation of a main arterial trunk had a great influence in limiting the indiscriminate amputation of limbs for gunshot wounds implicating the large blood vessels, which was then the practice. It also led to improvements in methods of amputating when the limb could not be saved, and threw considerable light on the process of healing in wounds. John Bell's *Treatise on Gunshot Wounds*, based on his experience amongst the wounded men of Admiral Duncan's fleet after the battle of Camperdown, and his *Principles of Surgery*, are among the surgical classics.

The claims of Edinburgh on John's younger brother, Charles Bell (1774–1842), are not so easily assessed, and have been discussed in a previous article. While still a student here he published a *System of Dissections*, illustrated by his own drawings, and it is said that "even before he left Edinburgh a suspicion had grown upon his mind that the prevalent opinion regarding the functions of the peripheral nerves was erroneous." The idea thus early implanted bore ample fruit after Charles went to London, and his work on the functions of the nerves placed him in the forefront of scientific discoverers. In 1836 he returned to Edinburgh as Professor of Surgery, but his life's work had been accomplished, and nothing was added to his fame during the six years he filled the Chair.

In the latter part of the eighteenth century also an attempt was made by James Rae, a Deacon of the Incorporation of Surgeons, by means of private lectures on diseases of the teeth, to place the practice of Dentistry on a more scientific basis than it had hitherto enjoyed. Rae was also the first to give a consecutive course of instruction in Clinical Surgery in the Edinburgh School.

Through the advocacy of John Bell, the Crown established, in 1806, a Chair of Military Surgery in the University, and this was successively held by John Thomson (1765–1846) and Sir George Ballingall (1786–1855). It cannot be said that the Professorship justified its existence, and on the death of Ballingall, James Syme had little difficulty in persuading the authorities to abolish it.

Towards the end of the eighteenth century a further development took place in the advance of Surgery. The intensive cultivation of Anatomy which had gone on for over two centuries and a half had given the surgeons an intimate acquaintance with the structure of the body, which enabled them to undertake operations that without this knowledge would have been impracticable. At the same time, means of controlling the loss of blood had gradually been evolved, and more was known of the nature of disease and of the reparative processes. The main obstacle to the performance of such serious operations as then appeared to be justifiable was the limits of endurance of the patient. Surgical anæsthesia was not yet available for the prevention of pain, so the alternative was to shorten the duration of the operation as far as possible. To this end manipulative dexterity was cultivated by surgeons in every possible way, from the practice of amateur carpentry to the playing of the fiddle.

A race of surgeons arose who vied with one another in the rapidity with which they could amputate a limb, excise a jaw, or trepan a skull, and the names of some have come down to us rather on account of their prowess in these directions than through their more purely scientific contributions to Surgery. Not that this was their only claim to remembrance. John Lizars, for example—the first in Scotland to ligate the innominate artery for aneurysm and to perform ovariotomy—was also the first to suggest, although he did not venture to perform, such operations as excision of the prostate gland, puncture of the brain in hydrocephalus, and the injection of air into the pericardium as a remedy for hypertrophy of the heart. Sir William Fergusson, although acclaimed after his death by Sir James Paget as "the greatest practical surgeon of his time," was also the strongest advocate of "conservative surgery," by which he sought to save limbs rather than to sacrifice them; and he devised an operation for cleft palate, which calls for delicate rather than for rapid work, as well as certain operations on the jaws, that are still practised as he directed. Robert Liston, perhaps the most brilliant operator of all, made valuable contributions to the knowledge of fractures, of diseases of bone, and of aneurysms, and after he went to University College Hospital he performed for the first time in England a major operation—amputation through the thigh—under ether anæsthesia.

A new epoch in Surgery opened with the introduction of anæsthesia, and Edinburgh's share in this advance is one of her most cherished traditions. James Young Simpson cannot be claimed by the surgeons, but his discovery of the anæsthetic properties of chloroform brought him very close to them. The story of his discovery is told elsewhere; here we need only acknowledge the debt that Surgery owes to his work.

One of the first to take advantage of it was James Syme, then at the height of his fame as Professor of Clinical Surgery. Syme did not belong to the school of brilliant surgeons, but as an operator he was one of the best. Even if his reputation depended merely on his operative work he would still rank as one of the greatest surgeons of all time; many of the procedures he devised are practised to-day in every detail as he first described them; some have been modified to suit altered conditions; but none has failed to stand the test of time.

But Syme was much more than a highly skilled craftsman, he was a trained scientific observer. As a boy, chemistry was his hobby, and he invented the substance known as "macintosh," in the course of his investigations on the distillation of coal tar. As a young graduate he took up the study of diseases of bones and joints, and made valuable additions to our knowledge of the disease known as caries of bone. This led on to his famous experiments on the bone-producing function of the periosteum, the results of which anticipated those of Ollier by twenty years. He also did much to improve the methods of treating incised wounds with a view of obtaining "healing by first intention," particularly by taking steps to prevent the accumulation of blood or inflammatory products, and his advocacy of "drainage of wounds" led to a marked improvement in this direction.

Syme was a pioneer, and one of the most successful advocates of the practice of excising diseased joints as an alternative to amputation—one of the most brilliant achievements of conservative Surgery. To attempt to assess Syme's share in the progress of Surgery in his own day, and the abiding influence of his work on the practice of ours, would lead us far beyond the limits here set us. His teaching and his practice were based on broad and sound general principles which he was ever trying to simplify. In 1863 his *Principles of Surgery* was simpler and clearer in its fifth edition than it had been thirty-two years earlier in its first. There were "few advances in Surgery that had not received some impulse from his indefatigable and vigorous mind"; in what proved to be his last clinical lecture he showed his acumen when he said of the work of Lister, then just beginning, that it "is certainly destined in no small degree to revolutionise the practice of Surgery." The extent to which it did revolutionise Surgery, and much besides, is now common knowledge, and the story of how it was all brought about need not be retold at length here.

Joseph Lister had literally seen the beginnings of the anæsthetic era of Surgery—he was present at Liston's first operation performed under ether in 1846; he had witnessed the surgical skill and dexterity of the most brilliant of the manipulative school of Surgeons; he had been attracted to Edinburgh by the fame of Syme as a scientific surgeon, and had remained as his House Surgeon, and, later, as Assistant Surgeon in the famous Royal Infirmary of Edinburgh. He had thus been in close contact with all that was best and most advanced in British Surgery, and was not wanting in appreciation of what he saw. But with it all something was lacking. Even in the hands of the masters the most carefully planned and skilfully performed operations too often ended in failure from the inflammatory complications that supervened. Many attempts had been made to improve matters by modifying the methods of operating, by employing special lotions for washing and dressing wounds, and by adopting new expedients in the after-treatment, but with little effect. Wounds continued to suppurate, and the spectre of sepsis ever dogged the footsteps of the surgeon. The frustration of the best efforts of the surgeon, and the sufferings of the patients, made a deep impression on Lister's sensitive nature, and prompted him to investigate the nature of the inflammatory process as it affects wounds, and the cause of the "unhealthy action" which gave rise to suppuration and all its sequelæ.

His classical study on the "Early Stages of Inflammation" laid the foundation of his later work. It settled many problems, but it raised as many new ones, each of which he took up and followed out with characteristic assiduity. Experiments on the effects of irritants on the distribution of the pigment in the stellate cells of the frog's web ; on the nervous mechanism for regulating the contraction of blood vessels ; on the process of coagulation of blood,—each threw some fresh light on his quest, without, however, revealing the essential cause of the phenomena he was investigating. That light came when Pasteur revealed the true nature of fermentation, and showed that it depends on the action of micro-organisms. Lister was quick to see the bearing of this discovery on his own work, and, by a series of observations too elaborate to quote here, he proved that the putrefaction of the discharges from wounds had a like cause. This point settled, there still remained the problem of how to prevent it, and the solving of this problem was Lister's great contribution to Surgery and to humanity.

To trace the influence of the antiseptic idea on the development of Surgery as an applied art would lead us far beyond the scope of the present note. Suffice it to say that Lister's work put the practice of operative Surgery on a sound scientific basis, and rendered possible all the advances that have been made since 1867. Nor need we stop to discuss the specious but fallacious distinction that some have sought to draw between "aseptic" and "antiseptic" Surgery. Lister's ideal was the exclusion of sepsis from wounds, and if the disciples of the so-called "aseptic" school succeed in doing so it is only by the use of "antiseptic" measures.

It was but natural that the most enthusiastic followers of Lister should be found among his colleagues and pupils in the Glasgow and Edinburgh Schools where his system had been evolved. To see his results was to believe; those who had not seen remained unbelievers. To convince them Lister accepted the invitation to the Chair of Clinical Surgery at University College, London, in 1877, and in the end he succeeded.

The further advances that have been made in Surgery in Edinburgh and elsewhere have for the most part been of a technical nature. The possibility of preventing infection of wounds opened up fields for the surgeon that had previously been closed to him. With the early exploration of one of these,—that concerned with abdominal surgery,—the Edinburgh School was specially associated through the work of Thomas Keith, whose skill in applying aseptic principles in the removal of ovarian tumours attracted world-wide attention. Abdominal, pelvic, thoracic and intra-cranial Surgery are all products, more or less directly, of the antiseptic idea, although coincident advances in physiology, biochemistry, bacteriology, pathology and other allied sciences have played a large part in bringing them to their present state.

The work of Thomas Annandale (Lister's successor), Patrick Heron Watson, Thomas Keith, Joseph Bell, John Duncan, John Chiene, F. M. Caird, and others, represents Edinburgh's share of the contribution which the successors of Lister have made to the common pool of surgical knowledge.

This cursory sketch of the history of Surgery in Edinburgh reveals only a part of the contribution made by the School to the progress of scientific Surgery. Edinburgh has always been a great teaching centre, and those of her sons who have gone forth from her gates imbued with her doctrines and traditions will be the last to deny her a share in the laurels they have garnered in the fields of science.

A. M.

MEDICAL SCHOOL SINCE 1870

The eight years from 1869 to 1877, during which Lister held the chair of Clinical Surgery in the University of Edinburgh, constitute one of the most important epochs in the development of medical science. While the antiseptic system of treating surgical wounds was suggested by Pasteur's work on putrefaction it really rested on an empirical and pragmatic basis. Essentially, the success of the treatment was its sanction, for it was not till the early eighties that the connection between definite bacterial species and the inflammations and suppurations of surgical wounds was actually proved, and the true meaning of the word putrefaction, as used by Lister, defined. The striking nature of Lister's results established the fundamental fact that somehow or other bacteria were responsible for surgical disasters, and favoured an attitude of receptivity towards the germ theory of infective disease in general which had been gradually emerging from the twilight research of the previous decade. During Lister's Professorship Edinburgh was the centre of interest for the whole medical world. The practical side of his work was eagerly followed by surgeons, but during the whole period he was engaged in scientific inquiries which not only were related to the development of the antiseptic system, but directed to investigating the nature and biology of the micro-organisms concerned in surgical infections. His experiments were characterised by great ingenuity and precision, and were a weighty contribution to the growing knowledge of the period. This knowledge culminated in Koch's work on anthrax, which furnished the first irrefragable proof of the germ theory of disease and formed the starting-point of the modern science of bacteriology. The termination of the long period of groping and uncertainty coincided with the end of Lister's Edinburgh Professorship.

In the late 'sixties of last century the continuous growth of the Edinburgh Medical School made it necessary for the University to face an enlargement of its accommodation for the teaching of Medicine. The progress of the project was slow, for its conception coincided with the movement to rebuild the Royal Infirmary. Not till 1877 were sufficient funds accumulated to justify an actual commencement of work being made, and eight more years elapsed before the medical departments were wholly transferred to the New Medical Buildings. While the University was thus provided with unequalled facilities for teaching it was somewhat unfortunate in the circumstance that its plans for extension were formulated before the necessity had been recognised of making adequate provision for the application of purely scientific methods to the problems of Medicine and Surgery. It has thus for thirty-five years laboured under the disadvantage of having a somewhat limited accommodation for research. Notwithstanding this, however, its staff and their pupils can show a worthy record of original work.

Of those who since Lister's time have made the Edinburgh School famous, two stand out pre-eminent, namely, the late Sir T. R. Fraser and Sir E. Sharpey Schafer. Fraser, while still a young man, had, along with Crum Brown, established for the first time the principle that a relationship exists between chemical constitution and pharmacological action, and his work with Christison on physostigmine had also brought him into notice. During his long tenure of the chair of Materia Medica his activities were characterised by an originality of mind which put him in the front rank of those who have built up the science of pharmacology in its present form. His investigations on strophanthus and on other cardiac stimulants placed the treatment of diseases of the heart on a new basis and paved the way for the more recent developments of this aspect of Medicine; his researches regarding aconite are no less noteworthy. Though his results regarding the nature of snake venoms and on immunisation against these poisons were anticipated by Calmette, his observations were independent, and are all the more outstanding in that they were undertaken at a time when the phenomena of immunity were only beginning to be recognised. Sir E. Sharpey Schafer had in London established his great reputation for research as a physiologist and histologist. After taking up the Chair in his subject in the University of Edinburgh in 1899 he continued and developed his work on the subject of the internal secretions which is world-famous, and which has contributed a new chapter to knowledge regarding the bodily functions. Sir Edward's contributions to physiology since coming to Edinburgh have, however, not been confined to one aspect of the subject but have covered a wide field. They have included an elaboration of a new method of carrying out artificial respiration, several studies on the functions of the central nervous system, a reinvestigation of the phenomena following vagotomy and section of the spinal sympathetic (as a consequence of which new and unexpected facts emerged), observations on muscular contraction and on the changes occurring in muscle during contraction, contributions to the question of chloroform anæsthesia, an examination of the minute histological structure of the liver, and research upon the pulmonary circulation.

Apart from work which on account of its merit attracts the general attention of the scientific world, there has come from the Edinburgh School a constant stream of substantial contributions to knowledge which no one concerned in any subject to which they are related can afford to neglect. Thus in the Department of Anatomy, though, as elsewhere dealt with, Sir William Turner devoted himself chiefly to the comparative aspects of the subject, as his observations on the cetacea show, and to anthropology, his outstanding personality stimulated his pupils to investigations of the more human aspects of the subject. D. J. Cunningham laid the foundations of his reputation while he was Turner's Senior Assistant, and although his chief work was carried on while holding the Trinity College, Dublin, Chair, he continued it on succeeding to the Edinburgh Professorship. From 1878 on for twenty years the method of studying the relationship of the organs of the human body by means of large frozen sections was widely applied, especially by the gynecologists—by Hart to the normal pelvis, by Barbour to the mechanism of labour, by Ballantyne to the structure of the human fœtus, by Symington to that of the child, and by Webster to the puerperium and to ectopic gestation. During recent years in the Department of Anatomy under Professor Robinson the method of reconstructing fœtal structures by the superimposition of sheets of wax prepared to reproduce the features of microscopic sections has shed important light on embryological questions. In the surgical department, with all the encouragement which Professor Chiene's pupils always received from their Chief, Stiles carried out his work on the pathology of cancer of the breast, with special reference to the dissemination of malignant tumours. He was among the first to apply the paraffin method to morbid histology, and his research contributed to the scientific foundation for the modern surgical treatment of malignant disease. In the Department of Pathology, in the late 'seventies, D. J. Hamilton, afterwards Professor of Pathology in Aberdeen, did much to further morbid anatomy by his studies on inflammation and on the differences between caseating and ordinary bronchopneumonia, which he substantiated before the tuberculous causation of the former could be recognised. His successor, G. Sims Woodhead, commenced his pathological career with a study on the pathology of the nervous system. He was also the first to introduce into Edinburgh the then infant science of bacteriology, and along with Hare he published the first text-book on its technique which appeared in the English language. His own contributions were chiefly related to the pathology of tuberculosis, and his microscopic sections of whole lungs affected with this disease were of great value in elucidating the methods by which infection of the respiratory organs originates and progresses; they still form a material part of the teaching collection of the Department. He thereby acquired that familiarity with tuberculosis which afterwards led to his being appointed Chairman of the Tuberculosis Commission. Later (1889–98), a series of outstanding researches from the Department were those of Muir, who, in his study of the bone marrow, independently of Ehrlich, described the life-history of the leucocytes which originate in that tissue, and who made a notable contribution to knowledge of the pathology of blood diseases. From this Department also came Beattie's research on the infective origin of acute rheumatism, and at a later date a renewed study of the blood by Carnegie Dickson.

During the years of Sir E. Sharpey Schafer's professorship the Department of Physiology has been a constant source of important original work. Much of this has been related to the subject of internal secretion, and here the researches of Herring on the pituitary and of Swale Vincent are outstanding. Amongst other contributions to knowledge are those of Sutherland Simpson on the central nervous system and on bodily temperature, of Tait on the blood and blood coagulation, especially in the lower animal forms, of Cramer and Pringle and of Addis,—also on blood coagulation,—of Jolly on several aspects of nerve action, of Cramer on protagon, on the assimilation of proteins (with Pringle) and other problems of physiological chemistry, of Kojima on the endocrine glands.

As has already been pointed out in a previous article, an important feature of Edinburgh medicine is the existence side by side of two medical schools—that of the University, which prepares students for its own degrees, and the Extramural, which under the auspices of the Royal College of Physicians and of the Royal College of Surgeons offers courses qualifying for the Licence of these Corporations. The relationships of the two schools have always been a puzzle to outsiders, largely from the fact that the University can recognise a certain number of extramural courses as qualifying for its degrees. The body of extramural teachers is constituted on a basis of tradition of which catholicity and freedom are the main features. Any one who can satisfy a Committee of one or other Corporation that he possesses a knowledge of a subject, a gift of exposition, and a sufficient teaching apparatus, may obtain recognition as a Lecturer, and subsequent success in attracting students in competition with other Lecturers depends on his own ability and energy. While teaching has been the main purpose of the extramural Lecturer, there have always been those who found time to advance their subjects by research. The anatomical work of Symington, already alluded to, falls under such a category, and further examples are found in Alexander Bruce's observations on the minute structure of the central nervous system, and the discovery of the so-called fuchsin bodies in cancer by Russell, who was amongst the earliest to stimulate inquiry into the minuter cytology of malignant growths.

To provide facilities for the growing tendency towards original work outside the University the Royal College of Physicians, in 1889, took the important step of setting up a research laboratory, and its organisation was entrusted to Woodhead, who, by the qualities he had exhibited in the University Department of Pathology, was marked out as one specially fitted to direct the energies of those taking up original work. The College carried on the Laboratory at its own charges till 1903. In that year the Carnegie Trust for the Universities of Scotland, recognising the important place the Laboratory had filled, became partners in its control and supported it financially under the Research Scheme of the Trust. From the commencement the Royal College of Surgeons has given its aid to the Laboratory, and within late years the University has also become a contributor to its upkeep. During its existence a constant stream of papers bearing on the scientific aspects of Medicine and Surgery has issued from the Laboratory. These have been the work of extramural teachers or of young graduates who, before passing into practice, or in their earlier years in practice, have thereby acquired that scientific habit of mind which inevitably raises the standard of professional attainment. During the early years of the Laboratory it was the place where many of those who had been assistants in University Departments and who had become Extramural Lecturers continued their researches. Among these were Hart, Barbour, Ballantyne and Webster, to whom reference has already been made. Among others working on anatomical subjects were Bruce, who continued his observations on the minuter structure of the central nervous system, and Berry, who made a special study of the Regional Anatomy of the Abdomen. In Surgery, there were the experimental inquiries of Miles into the conditions under which injuries to the brain occur, and Thomson's observations on tuberculosis of bone. In pharmacology, much of R. Stockman's earlier work was carried on in the Laboratory, such as his researches on narcotine and quinoline and his studies of the distribution of iron in the bodily organs in the anæmias. In pathology there was Gulland's work on blood diseases and of the bearing of data derivable from such conditions on the origin and life-history of the blood corpuscles. When Noel Paton succeeded Woodhead as superintendent he developed research on physiological lines, and especially in the application of chemistry to the problems of internal metabolism. Important work was done on dietetics, an example of which is the investigation of prison diets by Dunlop, who also studied the effects of muscular work. Paton also organised extensive researches on the functions of the ductless glands, especially of the thymus. As a member of a Royal Commission he investigated the habits of the salmon and brought out the rather startling fact that in that fish an atrophy of the gastric mucous membrane occurs on its ascending a river, and that it does not feed in fresh water. As an adjunct of this inquiry Patterson adduced evidence for believing that the salmon only becomes attacked by the saprolegnia fungus when it is the victim of a bacillary infection. On Paton going to Glasgow as Professor of Physiology, work in the Laboratory, under the direction of the writer of this article, rather reverted to pathology and bacteriology. An important series of researches were carried on by J. Fraser, by Mitchell and by Wang, regarding the relative frequency of infection by the human and by the bovine strains of the tubercle bacillus, and there was demonstrated that in diseases of bones and joints and of glands the milk of tuberculous cows is responsible for a predominant proportion of the infections which occur. Amongst other notable work of this period are the researches of M'Gowan on the bacterial diseases of domestic animals, of which his investigation of the bacillary origin of canine distemper is specially important, those of Dawson on the morbid anatomy of disseminated sclerosis, and of Addis on hæmophilia.

In closing this brief record of the past achievements of the Edinburgh Medical School, reference must be made to the part its members played in the earlier development of microscopic technique. In 1870, A. B. Stirling, sub-curator of the Anatomical Museum under Goodsir and Turner, published an account of a new mechanism for the cutting of microscopic sections. Stirling was a self-taught working man of very original ability who developed extraordinary skill in all departments of museum work. His microtome was the result of his being baffled in dealing with a desire on the part of Goodsir to have sections of parts of the brain larger than could be cut by hand. It consisted essentially of an upright tube with open top and a movable bottom which could be raised by a micrometer screw. The object to be cut was fixed in the tube and successive thin slices could be shaved off its top by raising the block by operating the screw. The instrument was elaborated by Rutherford, afterwards Professor of Physiology, who embedded the object in gum in the tube and surrounded the latter with a freezing mixture. Hamilton, of the Pathology Department, introduced the further improvement of substituting gum and syrup for gum, the brittleness of which was a disadvantage. Another advance in the technique of cutting sections was initiated by Roy, afterwards Professor of Pathology in Cambridge, who introduced the principle of freezing the object with ether. Cathcart, in 1883, devised the microtome associated with his name, the feature of which was a much improved method of securing a satisfactory ether spray, and his instrument is still in use, especially in pathological work where the microscopic examination of tissues within a few minutes of their removal from the body may be an important desideratum. The paraffin method has, of course, superseded the earlier technique of section cutting, but the developments described above played a definite part in the progress of histology.

The Corporation of Edinburgh has always been in the forefront in its public health administration. Its sewage farm at Craigentinny, where a large portion of the city's sewage is used for the cultivation of meadows, had been the first attempt on a large scale at this form of water-borne refuse disposal. John Roberton's *Medical Police* (Edinburgh, 1808) was the most important treatise on public hygiene after that of Johann Peter Frank. In more recent times, under the vigorous and enlightened guidance of Sir Henry Littlejohn as Medical Officer of Health, many reforms and developments were introduced which were in effect experiments of great value in their bearing on social science. The city was the first great Local Authority to introduce the compulsory notification of infectious disease, which it did in 1879, by means of a Local Act. The thorough way in which Sir Henry tackled the problems of a pure water supply and the systematic removal of refuse, has placed the city in the enviable position of having the lowest death-rate from typhoid fever in the world, and was a demonstration of the means by which intestinal infections originate, and of the methods by which their spread can be controlled. His proof that the prevalence of tuberculosis in households was inversely proportional to the number of rooms a family occupies was again a demonstration of the part which dosage of an infective agent plays in its pathogenicity, and the work constituted an important contribution to sanitary science. Any reference to the development of this branch of knowledge in Edinburgh would be incomplete if no notice were taken of the anti-tuberculosis organisation which, during the past thirty years, has been built up and perfected by Sir Robert Philip, now Professor of Tuberculosis in the University. Starting as a private movement its success so appealed to the charitable public that a Trust was formed which for years carried on the many lines of activity involved, till legislation laid on local authorities responsibility for dealing with tuberculous disease. When this came into force the organisation was, in 1912, taken over by the Corporation as the scheme for the city. The essential features of Sir Robert Philip's system included the opening of tuberculosis dispensaries, to which patients came for diagnosis and treatment, the education of the patients in a proper mode of living, and the following up of cases to their homes in order to ascertain whether the conditions of the household favoured the proper treatment of the disease and whether the principles laid down as to food and fresh air were being followed out. This domiciliary visitation was taken advantage of for the systematic examination of contacts, so that infection might be detected in its earliest stages. Provision was also made for sanatorium treatment in the Victoria Hospital, situated in the outskirts of the city, where it was possible for patients to live a completely open-air life. When the individual was definitely established on an up-grade course, he was transferred to a Farm Colony in the country, where, as improvement continued, he could be put to light work and thus prepared for resuming ordinary life. The development of this great and complex mechanism, conceived on scientific lines, has been studied by all who are concerned in the fight against tuberculosis, and it has been taken as a model for similar organisations all over the world.

The war burst over the Edinburgh School in the act of inaugurating a new enterprise for extension and development. Only a few months before, the three great Corporations—the University, the Royal College of Physicians and the Royal College of Surgeons—had entered into an agreement for the promotion of a memorial of Lister, to take the form of an institute for medical research which would include new teaching departments for the University Departments of Pathology and Bacteriology. The scheme had reached the stage of negotiation for a site, 2¼ acres in extent, to the north-west of the Royal Infirmary. In the face of great difficulties these negotiations were concluded in the end of 1914, and it is only now that the parties concerned are resuming their interrupted efforts towards the attainment of their aim. During the war the activities of the School in the way of original work were almost entirely suspended. The various departments lost practically all the junior members of their staffs, and the energies of the professors were wholly occupied with the duties of teaching. Nevertheless, during the years of leanness developments have occurred. The work of the Chair of Bacteriology, founded by Robert Irvine of Royston, Granton, in 1913, is being developed. The Chair of Materia Medica is now chiefly devoted to the subject of Pharmacology. It became vacant in 1918 through the resignation of Sir Thomas Fraser, and Professor A. R. Cushny was elected as his successor. The Professor of Materia Medica had, up till then, been also one of the Professors of Clinical Medicine, with charge of wards in the Royal Infirmary. These are now attached to a new Chair,—the Christison Professorship of Therapeutics,—and in 1919 Professor J. Meakins was brought from M'Gill University, Montreal, as its first occupant. The conditions of the office are that he shall devote his whole time to the care of patients and to teaching and research in his subject. For the fulfilment of the last duty he has been provided with a research laboratory within the Infirmary at the joint expense of the University and the Infirmary Board. In 1919 the growth of the Department of Chemistry led to a new professorship being created for the instruction of students of Medicine in this subject. Professor Barger was inducted as the first occupant of the Chair, and the removal of pure chemistry from the Medical Buildings, which is in process of accomplishment, will facilitate his being provided with a research department adequate to his requirements. These developments must all work to continued progress in scientific Medicine in Edinburgh in the future.

J. R.

Private Proof.

University of Edinburgh

HISTORY OF MEDICINE

SPECIMEN EXTRACTS

(SECOND SERIES)

JOHN D. COMRIE, M.A., B.Sc., M.B.
LECTURER

INTRODUCTION

In the following specimens of old masters in medicine an attempt has been made to continue a similar series translated from classical medical writers, and to present extracts illustrative of the position occupied by the healing art, and of some advances made in it at successive periods from the fourth century to the eighteenth.

No continuity of subject is attempted, since the extracts are chosen simply for illustration of different points dealt with in the writer's lectures and for distribution to the students attending these, by whom access to copies of old medical writers cannot readily be obtained.

For the same reason, and because a selection had to be made, many important authors are not represented.

J. D. C.

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SPECIMEN EXTRACTS

(SECOND SERIES)

ORIBASIUS (326–403 A.D.), *physician and friend of the Emperor Julian, was born at Pergamos, lived in the Byzantine court, and made several compilations from the best medical authors. On the death of Julian, being banished from the Empire, he was received with the highest honours by the Gothic king.*

ΟΡΕΙΒΑΣΙΟΥ ΙΑΤΡΙΚΩΝ ΣΥΝΑΓΩΓΩΝ ΠΡΟΣ ΙΟΥΛΙΑΝΟΝ

Βιβ. α΄. Προοίμιον.—*τὰς προσταχθείσας ἐπιτομὰς παρὰ τῆς σῆς Θειότητος, αὐτόκρατορ Ἰουλιανέ, πρότερον, ἡνίκα διετρίβομεν ἐν Γαλατίᾳ τῇ πρὸς ἑσπέραν, εἰς τέλος ἤγαγον, καθὼς ἠβουλήθης, ἅστινας ἐκ μόνων τῶν ὑπὸ Γαληνοῦ γραφέντων ἐποιησάμην. ἐπεὶ δὲ ἐπαινέσας ταύτας, δευτέραν ἐπέταξας πρᾶξιν, πάντων τῶν ἀρίστων ἰατρῶν ἀναζητήσαντά με τὰ καιριώτατα συναγαγεῖν καὶ πάντα ὅσα χρησιμεύει πρὸς αὐτὸ τὸ τέλος τῆς ἰατρικῆς, καὶ τοῦτο πράττειν, ὡς οἷός τέ εἰμι, προθύμως διέγνωκα, χρησιμωτάτην ὑπολαμβάνων ἔσεσθαι τὴν τοιαύτην συναγωγήν, τῶν ἐντυγχανόντων ἑτοίμως ἐξευρισκόντων τὸ ἑκάστοτε τοῖς δεομένοις ὠφέλιμον.*

Βιβ. ι΄. γ΄. Περὶ τῶν αὐτοφυῶν λουτρῶν. Ἐκ τῶν Ἀντύλλου.

τῶν δε αὐτοφυῶν λουτρῶν πολὺ ἡ δύναμίς ἐστιν ἰσχυροτέρα καὶ δραστικωτέρα τῶν ἐξ ἐπιτεχνήσεως· εἴσι δὲ διαφοραὶ πλείους παρὰ τὴν τῆς γῆς ποιότητα, διὰ ἧς φέρεται· τὰ μὲν γάρ ἐστι νιτρώδη, τὰ δὲ ἁλμυρά, τὰ δὲ στυπτηριώδη, τὰ δὲ θειώδη, τὰ δὲ ἀσφαλτώδη, τὰ δὲ χαλκανθώδη, τὰ δὲ σιδηρίζοντα, τὰ δὲ σύνθετα ἐκ τούτων, πλειόνων ποιοτήτων ὁμοῦ συμμιγνυμένων. πάντων μὲν οὖν τῶν αὐτοφυῶν ὑδάτων ἡ δύναμίς ἐστι ξηραντικὴ καὶ θερμαντική, τὸ ἐπίπαν σφόδρα εὐτόνων ὑπαρχόντων· διὸ δὴ καὶ τοῖς ὀξέσι νοσήμασιν οὐχ ἁρμόζει, ἀλλὰ μᾶλλον τοῖς χρονίοις, καὶ τούτων μάλιστα τοῖς καθύγροις καὶ ψυχροῖς. ἤδη δὲ τὰ μὲν νιτρώδη καὶ ἅλας ἔχοντα κεφαλῇ κατάλληλα καὶ θώρακι ῥευματιζομένῳ, καὶ στομάχῳ καθύγρῳ καὶ ὑδρωπικοῖς, οἰδήμασί τε τοῖς ἐκ νόσων, καὶ συγκρίσει φλέγματος γεννητικῇ· τὰ δὲ στυπτηριώδη αἵματός τε ἀναγωγαῖς, καὶ ἐμετικῷ στομάχῳ, καὶ τοῖς ἀμέτρως ὑπὸ αἱμοῤῥοΐδων ἐνοχλουμένοις, καὶ γυναιξὶν ἀτάκτως καθαιρομέναις καὶ συνεχῶς ἐκτιτρωσκούσαις.

Βιβ. μζ΄. ιδ΄. Περὶ ἀκρωτηριασμοῦ. Ἐκ τῶν Ἡλιοδώρου.

ἀφαιρεῖται χείρ, ἢ πούς, γαγγραίνης γενομένης, ἢ ἐξ ἄλλης αἰτίας νεκρωθέντος ἄκρου τινός. τὰ μὲν οὖν κάτω μέρη τῶν ἄκρων ἀκινδυνότερον ἀφαιρεῖται, τὰ δὲ ὑπεράνω ἀγκῶνος ἢ γόνατος μετὰ κινδύνου, διὰ τὸν κατὰ τὸ πλεῖστον ἐν χερσὶ κατὰ αἱμορραγίαν γινόμενον κίνδυνον, μεγάλων ἀγγείων διακοπτομένων. ἔνιοι μὲν οὖν κενόσπουδον τάχος ἐπιτηδεύοντες, κατὰ μίαν ἐπιβολὴν ὅλα τὰ σώματα ἐπιχαράσσουσιν, ἔπειτα ἐκπρίζουσι τὰ ὀστᾶ. οὐ γίνεται δὲ ἀκίνδυνος ἡ τοιαύτη ἀφαίρεσις, πολλῶν ἀγγείων κατὰ τὸν αὐτὸν καιρὸν αἱμορραγούντων· διό μοι δοκεῖ τὰ ἀσαρκότερα μέρη τοῦ

Bk. I. PREFACE.—I first finished, in accordance with your desire, those abridgments which your Divinity, Emperor Julian, ordered me to make while we were travelling in Western Gaul. These I made solely from Galen's writings. As these met with your approval you entrusted me with a second task, namely to look out and collect the principal views of all the best physicians and whatever was of most use in furthering the aims of medicine. I have quite willingly made up my mind to undertake this work to the best of my ability, for I see that a compilation of this kind will prove most useful, since any who chance to read it will easily find what is needful for the requirements of any case.

Bk. X. 3. ON NATURAL MINERAL BATHS. (From the Works of Antyllus)

The action of natural baths is much more powerful and efficacious than that of artificial ones. There are also differences in mineral waters due to the nature of the soil through which each passes. Some are alkaline, others saline, others aluminous, others sulphurous, others bituminous, others contain copperas, others iron; others again are combinations of these due to the mixture of several substances. Now all these natural mineral waters have a drying, warming action, generally speaking they are very powerful. So they are not suitable for acute troubles, but rather for chronic illnesses, particularly the moist and cold. First those which are alkaline and saline are suitable for catarrh in the head or chest, for fluidity of the belly, and dropsy, for swellings caused by disease, and for a constitution productive of phlegm. Then alum baths are suitable for spitting of blood and for a vomiting stomach, for those who are greatly troubled by piles, and for women whose purification is irregular or who constantly miscarry.

Bk. XLVII. 14. ON AMPUTATION. (From the Works of Heliodorus)

The hand or the foot is removed when gangrene has set in or when the extremity is dying for any other reason. The distal parts of the extremities may be removed without risk, those proximal to the elbow or knee with risk owing generally to sudden haemorrhage, as the vessels cut are large. Some seeking haste as a fad, divide all the muscles at one slash, and then saw the bones; but such an amputation is not without risk, because many vessels spurt blood at the same time; so it seems good to me first to cut the less fleshy

κῶλον πρότερον διελεῖν, ὡς κατὰ τὸ ἀντικνήμιον, ἔπειτα πρίζειν, καὶ μετὰ τὴν τῶν ὀστῶν πρῖσιν τὰ λοιπὰ σώματα διακόπτειν πρὸς τὴν τοῦ μέρους ἀφαίρεσιν.

ΟΡΕΙΒΑΣΙΟΥ ΠΡΟΣ ΕΥΣΤΑΘΙΟΝ ΤΟΝ ΥΙΟΝ ΑΥΤΟΥ ΣΥΝΟΨΙΣ

λογ. θ. ζʹ. περὶ πλευρίτιδος. ἐκ τῶν Γαληνοῦ.—ἡ ἀκριβὴς πλευρῖτις ἐν πρωτοπαθείᾳ τοῦ ὑπεζωκότος γίνεται· διὸ μέχρι κλειδὸς καὶ ὑποχονδρίων ὁ πόνος ἐξικνεῖται. εἰ μὲν οὖν εἰς κλεῖν ὁ πόνος διατείνει, φλεβοτομίας χρεία· εἰ δὲ εἰς ὑποχόνδριον, καθάρσεως· εἰ μέντοι μέτριον εἴη τὸ ἄλγημα καὶ μὴ νυγματῶδες, οὐ μεγάλης δεῖται βοηθείας. δώσομεν οὖν τοῖς οὕτω κάμνουσι φάρμακα τῆς λεπτυνούσης δυνάμεως, μέτρια μὲν ἐπὶ τῶν φλεγμαινόντων, ὅσα δὲ ἰσχυρότερα κατὰ τὰς παρακμὰς τῶν φλεγμονῶν. μέτρια μὲν οὖν ἐστιν ὅ τε τῆς πτισάνης χυλὸς καὶ τὸ μελίκρατον· ἰσχυρότερον δὲ τὸ τῆς ἀκαλήφης σπέρμα καὶ ὅταν ἐμβληθῇ τι τῷ μελικράτῳ τῶν δριμειῶν βοτανῶν, οἷον ὀριγάνου καὶ ὑσσώπου καὶ καλαμίνθης, γληχοῦς τε καὶ ἴρεως.

PAULUS AEGINETA (*circa* 600 A.D.) *was the most celebrated of the Greek medical writers of the later Empire. The sixth book of his Outline* (ὑπόμνημα) *of Medicine deals with surgery, and was a text-book renowned throughout the Middle Ages.*

ΠΑΥΛΟΥ ΑΙΓΙΝΗΤΟΥ ΙΑΤΡΟΥ ΑΡΙΣΤΟΥ ΒΙΒΛΙΑ ΕΠΤΑ

Περὶ ἀνευρύσματος.—τὸ ἀνεύρυσμα ὄγκος εὐαφής ἐστι καὶ τοῖς δακτύλοις ὑπείκων ἐξ αἵματός τε καὶ πνεύματος ἔχων τὴν γένεσιν. . . . τὰ δὲ ἐν τοῖς ἄκροις καὶ τοῖς κώλοις ἢ ἐν κεφαλῇ χειρουργητέον οὕτως· εἰ μὲν κατ᾽ ἀνευρυσμὸν ὁ ὄγκος ἐγένετο διαίρεσιν εὐθεῖαν ἐμβαλλοῦμεν τῷ δέρματι κατὰ μῆκος. ἔπειτα διαστείλλαντες ἀγκίστροις τὰ χείλη, καθάπερ ἐπὶ τῆς ἀγγειολογίας ἐλέγομεν περιδέροντες, καὶ δι᾽ ἐξ ὑμενιστήρων διακαθαίροντες, γυμνώσομεν τὴν ἀρτηρίαν. καὶ τῇ τῆς βελόνης διαγωγῇ τῇ τε διὰ τῶν δύο βρόχων ἀπολινώσει χρισάμενοι νύξαντες πρότερον φλεβοτόμῳ μεταξὺ τῆς ἀρτηρίας καὶ ἐνώσαντες τὸν περιερχόμενον τῇ πυοποιῷ χρησώμεθα θεραπείᾳ ἄχρις ἀποπτωσέως τῶν βρόχων.

parts of the limb, such as down the front of the leg, then to saw, and after the sawing of the bones to cut through the remaining muscles for the removal of the part.

THE SYNOPSIS OF ORIBASIUS FOR HIS SON EUSTATHIUS

Bk. ix. 7. ON PLEURISY. (From the Works of Galen.)—True pleurisy begins with an affection of the pleural membrane; thus the pain reaches to the clavicle and to the hypochondrium. If then the pain extends to the collar-bone, blood-letting is necessary; if to the hypochondrium, purging. If, however, the pain be moderate and not stabbing, it requires but little treatment. We shall give therefore to persons thus affected drugs of attenuating power, those which are moderately so to the fevered, and those which are stronger as the inflammation abates. Moderate remedies are the decoction of barley and honied milk; while nettle-seed and honied milk, to which one has added some of the pungent herbs, like marjoram, hyssop, mint, pennyroyal and iris, are stronger remedies.

THE SEVEN BOOKS OF PAULUS AEGINETA THE EXCELLENT PHYSICIAN

ON ANEURYSM.—Aneurysm is a tumour soft and yielding to the fingers, produced by blood and spirit. . . . But those which are on the extremities, limbs, or head must be operated on thus. If the swelling has developed as an aneurysm we make a straight cut lengthwise in the skin: then separating the lips with hooks, and stripping off the skin around as we described in treating of blood-vessels, and freeing it from its membranes, we lay bare the artery. We pass a needle under it and tie it with two ligatures. We then divide it between the ends of the artery with a lancet with which we cut around (the aneurysm), and then use suppurative treatment till the ligatures fall off.

Περὶ καθετηρισμοῦ καὶ κλυσμοῦ κύστεως.—πολιφθέντος οὔρου κατὰ τὴν κύστιν διά τινα ἔμφραξιν οἷον ἀπὸ θρόμβων ἢ λίθων, ἢ ἄλλην αἰτίαν τινὰ χρησώμεθα καθετηρισμῷ προσκομιδὴν τοῦ περιττοῦ. λαβόντες οἷον πρὸς ἡλικίαν καὶ γένος ἁρμόζοντα καθετῆρα εὐωδιάσωμεν αὐτόν. ὁ δὲ τοῦ εὐωδιασμοῦ τρόπος τοιοῦτός ἐστιν. ἔριον σμικρὸν λίνῳ δήσαντες κατὰ τὴν μεσότητα τὸ λίνον τε δι᾽ ὀξυρρίνου διαγαγόντες διὰ τῆς τοῦ καθετηρίου σύριγγος, τὸ ἔριον ἐφαρμόσωμεν τῷ βήματι τῷ πρὸς τῷ πυρῆνι τοῦ καθετῆρος. καὶ ψαλίσαντες τὰ ἐξέχοντα τοῦ ἐρίου καθίσωμεν εἰς ἔλαιον τὸν καθετῆρα, τὸν δὲ κάμνοντα χρηματίσαντες εἰς καθέδρυον προκαταιονήσαντες εἰ μή τι κωλύοι. λαβόντες τε τὸν καθετῆρα, καθήσωμεν ἐπ᾽ εὐθείας πρῶτον ἄχρι βάσεως τοῦ καυλοῦ. κἄπειτα τὸ αἰδοῖον ἀνακλάσωμεν, ὡς πρὸς τὸν ὀμφαλόν. καὶ γὰρ ἀπὸ τούτου τοῦ μέρους σκολιὸς ὑπάρχει τῆς κύστεως ὁ πόρος. κἄπειθ᾽ οὕτως τὸν καθετῆρα προσοίσωμεν. ἐπειδὰν δὲ κατὰ τὸν περίναιον πλησίον τῆς ἕδρας γένηται πάλιν τὸ αἰδοῖον ἐγκειμένου τοῦ ὀργάνου κατακάμψωμεν εἰς τὸ κατὰ φύσιν ἐπάγοντες χρῆμα. ἀπὸ τοῦ περιναίου τῆς κύστεως ὁ πόρος ἄνω τείνει. προσβιβάσωμέν τε τὸν καθετῆρα, ἕως τὴν κύστιν κενεμβατήσῃ. μετὰ δὲ ταῦτα ἐπισπασώμεθα τὸ ἐγκείμενον τῷ καθετῆρι λῖνον ἵνα τῷ ἐρίῳ συνεφελκόμενον τὸ οὖρον ἐπακολουθήσῃ καθάπερ ἐπὶ τῶν σομφώνων γίνεται. τοιοῦτος μὲν ὁ τῆς καθέσεως τρόπος. ἐπειδὴ δὲ πολλάκις ἑλκωθεῖσαν κύστιν δεόμεθα κλύσαι, εἰ μὲν ὠτικοὶ κλυστῆρες δύναιντο παραπέμπειν τὸ ἔνεμα, ἐκείνοις χρησώμεθα κατὰ τὸν εἰρημένον τρόπον παραπέμποντες αὐτούς· εἰ δὲ μὴ δυνατὸν εἴη, τῷ καθετῆρι προσαρμώσαντες τὸ δέρμα ἢ κύστιν βοείαν διὰ τῆς καθετῆρος ἐνέσεως ἐγκλύσωμεν.

Περὶ τῶν ἀπὸ τῶν γευστῶν ποιοτήτων δηλουμένων κράσεων.—μυελός, μαλακτικῆς τῶν σκληρυνομένων τε καὶ σκιρρουμένων σωμάτων. ἔστι δυνάμεως κάλλιστος μὲν ὁ τῶν ἐλάφων, ἐφεξῆς δ᾽ αὐτῷ ὁ τῶν μόσχων· ὁ δε ταύρων καὶ τῶν τράγων δριμύτερός ἐστι καὶ ξηραντικώτερος· καὶ ὁ μὲν ἀπὸ τῶν κόλων λιπαρώτερός ἐστι καὶ μαλακτικώτερος, ὁ δὲ τῆς ῥάχεως σκληρότερός τε καὶ αὐχμηρότερος.

σίδηρος ἐν ἀποσβεσθεὶς ὕδατι πολλάκις ξηραντικὴν ἱκανῶς αὐτῷ δύναμιν ἀποτίθεται· πινόμενόν γ᾽ οὖν ἁρμόττει σπληνικοῖς. εἰ δὲ εἰς οἶνον ἀποσβεσθείη κοιλιακοῖς τε καὶ δυσεντερικοῖς καὶ χολεριῶσιν ἐκλελυμένοις στομάχῳ ἀρήγει.

ON CATHETERISM AND WASHING OF THE BLADDER.—The urine being accumulated in the bladder by some stoppage such as clots or stones, or by some other cause, we employ catheterism to draw off the excess. Taking a catheter suited to the age and sex we dress it in the following manner. Having bound a little wool round the middle with a thread and pushed the thread through the beak along the tube of the catheter, we adjust the wool to the step on the rounded head of the catheter. And having trimmed the excess of wool we set the catheter in oil. After bathing the patient, if nothing prevent it, we set him in a chair. Taking the catheter we first push it straight down to the base of the penis. Then we pull up the privates towards the navel, for from this part the passage to the bladder is curved. And next we shall carry on the catheter thus. And when it comes down to the perineum near the anus we again lower the privates to their natural position, with the instrument enclosed, still pushing it on. From the perineum the passage to the bladder stretches upwards, and we let the catheter pass right on into the cavity of the bladder. After that we pull on the thread lying in the catheter so that the urine attracted by the wool follows on, as happens in sponges. Such is the method of the introduction. But as we often require to wash out an ulcerated bladder, if ear-syringes are able to effect the injection we use these in the manner described. But if it is not possible, we fit to the catheter a bag formed from the skin or bladder of an ox and, introducing the catheter, make the injection.

ON THE NATURE OF SUBSTANCES AS SHOWN BY THEIR TASTE.—Marrow is a softener of bodies hardened or engrained. That of stags is of most exquisite potency; next to it that of calves; that of bulls and goats is more pungent and drying. That from the bowels is more oily and softening, that from the spine is harder and drier.

Iron quenched in water often gives to it quite a drying property. Drunk, therefore, it suits diseases of the spleen. If quenched in wine it helps those suffering in belly and bowels and cholera patients with excessive looseness.

The Leech-Book compiled for Bald, an old English leech, dates from about 900–950 A.D. *It is the earliest account left of Saxon medicine and shows many traces of Greek, Irish, and Scandinavian influence. It is learned but primitive.*

LAECE BOC

I. xiii. Ƿið hær scearde hwit cwudu gecnuwa swiðe smale do æges ꝥ hwite to ⁊ meng swa þu dest teafor onsnið mid seaxse seowa mid seolce fæste smire mid þonne mid þære sealfe utan ⁊ innan ær se seoloc rotige · gif tosomne teo rece mid handa smire eft sona.

xxv. Gif scancan synd forode nim banwyrt gecnuwa geot æges ꝥ hwite meng tosomne scancforedum men. Ƿið foredum lime lege þas sealfe on ꝥ forode lim ⁊ forlege mid elmrinde do spilc to · eft simle niwa oþꝥ gehalod sie gerendra elm rinde ⁊ awyl fwiðe do þonne of þa rinde genim linsæd gegrind briwe wið þam elmes drænce ꝥ bið god sealf foredum lime.

II. lix. Ƿið þære healf deadan adle ⁊ hwanon seo cume · seo adl cẏmð on þa swiðran healfe þæs lichoman · oððe on þa wẏnstran · þær þa sina toslupað ⁊ beoð mid slipigre ⁊ þiccere wætan ẏfelre ⁊ ẏfelre þiccere ⁊ mẏcelre. þa wætan man scæl mid blodlæsum ⁊ drencum ⁊ læcedomum on weg adon. . . . Soðlice seo adl cẏmð on monnan æfter feowertigum oððe fiftigum wintra gif he bið cealdre gecẏndo þonne cẏmð æfter feowertigum elcor cẏmð æfter fiftigum wintra his gærgetales · gif hit gingran men gelimpe þonne bið ꝥ eaðlæcnere · ⁊ ne bið seo ẏlce adl þeah þe ungleawe læcas wenan ꝥ ꝥ seo ẏlce healfdeade adl si. hu gelic adl on man becume on geogoðe on sumum lime swa swa seo healfdeade adl on ẏldo deð. . . . Gif mon sẏ þære healfdædan adle seoc · oððe bræc seoc · wẏrc him oxumelli suðerne eced drenc ecedes ⁊ huniges ⁊ wæteres gemang. . . . Eal swa same se petra oleum he is god ⁊feald to drincanne wið innan tiedernesse ⁊ utan to smerwanne on wintres dæge for þon þe he hæfð swiðe micle hæte for ðy hine mon sceal drincan on wintra. . . . þis eal het þus secgean Ælfrede cyninge domne Helias patriarcha on Gerusalem.

III. lxiv. Drenc wiþ deofles costunga · þefan þorn cropleac eletre ontre bisceop wyrt finul cassuc betonice · gehalga þas wyrta do on ealu halig wæter ⁊ sie se drenc þær inne þær se seoca man inne sie ⁊ simle ær þon þe he drince sing þriwa ofer þam drence · deus in nomine tuo saluum me fac.

lxxiii. Gif men sie innelfe ute gecnua galluc awring þurh clað on cu wearme meolce · wæt þine handa þær on ⁊ gedo ꝥ innelfe on þone man geseowe mid seolce wyl him þonne galluc .VIIII. morgnas butan him leng þearf sie fed hine mid fersce hænne flæsc.

I. xiii. For hare-lip, pound mastic very small, add the white of an egg, and mingle as thou dost vermillion, cut with a knife (the false edges of the lip), sew fast with silk, then smear without and within with the salve, ere the silk rot. If it draw together, arrange it with the hand; anoint again soon.

xxv. If shanks be broken, take bonewort, pound it, pour the white of an egg (out), mingle these together for the shank-broken man. For a broken limb, lay this salve on the broken limb, and overlay with elm rind, apply a splint, again, always renew (these) till the limb be healed; clean some elm rind, and boil it thoroughly, then remove the rind, and take linseed, grind it for a brewit with the elms drink; that shall be a good salve for a broken limb.

II. lix. For the half dead disease and whence it cometh. The disease cometh on the right side of the body or on the left, where the sinews are powerless, and are (afflicted) with a slippery and thick humour, evil, thick and mickle. The humour must be removed with blood-lettings and draughts and leechdoms. . . . Well, the disease cometh on a man after forty or fifty winters; if he be of a cold nature, then it cometh after forty; otherwise it cometh after fifty winters of his tale of years; if it happen to a younger man then it is easier to cure, and it is not the same disease, though unclever leeches ween that it is the same half dead disease. How can a like disease come on a man in youth in one limb, as the half dead disease doth in old age? . . . If a man be sick of the half dead disease, or epileptic, work him with oxymel, a southern acid drink, a mixture of vinegar, and honey, and water. . . . Similarly also petroleum is good to drink simple for inward tenderness, and to smear on outwardly on a winters day, since it hath very much heat; hence one shall drink it in winter. . . . All this Dominus Helias, patriarch at Jerusalem, ordered one to say to King Alfred.

III. lxiv. A drink against temptations of the devil: tuftythorn, cropleek, lupin, ontre, bishopwort, fennel, cassuck, betony; hallow these worts, put into some ale some holy water, and let the drink be in the same chamber as the sick man, and constantly before he drinketh sing thrice over the drink, "Deus, in nomine tuo salvum me fac."

lxxiii. If a man's bowel be out, pound galluc, wring through a cloth into milk warm from the cow, wet thy hands therein, and put (back) the bowel into the man, sew up with silk, then boil him for nine mornings galluc, except need be for a longer time, feed him with fresh hens flesh.

RHAZES (*circa* 900 A.D.), *born in Chorasan, practised later in Bagdad. He was a voluminous medical writer, and gave the first clear account of Small-pox and Measles.*

RHAZES ON THE SMALL-POX AND MEASLES
(Greenhill's Translation)

"In the name of Allah, the Compassionate, and Merciful."

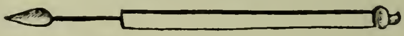
Abu Becr Mohammed Ibn Zacariya (i.e. RHAZES) says:—It happened on a certain night at a meeting in the house of a nobleman, of great goodness and excellence, and very anxious for the explanation and facilitating of useful sciences for the good of mankind, that, mention having been made of the Small-pox, I then spoke what came into my mind on the subject. Whereupon our host (may Allah favour men by prolonging the remainder of his life) wished me to compose a suitable, solid, and complete discourse on this disease, because there has not appeared up to this present time either among the ancients or the moderns an accurate and satisfactory account of it. And therefore I composed this discourse, hoping to receive my reward from the Almighty and Glorious Allah, and awaiting his good pleasure. . . . As to any physician who says that the excellent Galen has made no mention of the Small-pox, and was entirely ignorant of this disease, surely he must be one of those who have either never read his works at all, or who have passed over them very cursorily. . . . If, however, anyone says that Galen has not mentioned any peculiar and satisfactory mode of treatment for this disease, nor any complete cause, he is certainly correct; for, unless he has done so in some of his works which have not been published in Arabic, he has made no further mention of it than what we have just cited. . . . As to the moderns, although they have certainly made some mention of the treatment of the Small-pox (but without much accuracy or distinctness), yet there is not one of them who has mentioned the cause of the existence of the disease, and how it comes to pass that hardly anyone escapes it, or who has disposed the modes of treatment in their right places. . . . I am now to mention the seasons of the year in which the Small-pox is most prevalent; which are, the latter end of the autumn, and the beginning of the spring; and when in the summer there are great and frequent rains with continued south winds, and when the winter is warm, and the winds southerly. When the summer is excessively hot and dry, and the autumn is also hot and dry, and the rains come on very late, then the Measles quickly seize those who are disposed to them; that is, those who are of a hot, lean, and bilious habit of body. . . . The eruption of the Small-pox is preceded by a continuous fever, pain in the back, itching in the nose, and terrors in sleep. These are the more peculiar symptoms of its approach, especially a pain in the back, with fever; then also a pricking which the patient feels all over his body; a fullness of face, which at times goes and comes; an inflamed colour, and vehement redness in both the cheeks; a redness of both the eyes; a heaviness of the whole body; great uneasiness, the symptoms of which are stretching and yawning; a pain in the throat and chest, with a slight difficulty in breathing, and cough; a dryness of the mouth, thick spittle, and hoarseness of the voice; pain and heaviness in the head; inquietude, distress of mind, nausea and anxiety (with this difference, that the inquietude, nausea and anxiety are more frequent in the Measles than in the Small-pox; while, on the other hand, the pain in the back is more peculiar to the Small-pox than to the Measles); heat of the whole body, an inflamed colour and shining redness, and especially an intense redness of the gums. . . . It is necessary that blood should be taken from children, youths and young men who have never had the Small-pox, or have had only the Chicken-pox (especially if the state of the air, and the season, and the temperament of the individuals be such as we have mentioned above), before they are seized with a fever, and the symptoms of the Small-pox appear in them. . . . We will now mention those medicines which thicken and cool the blood, and check its putrefaction and ebullition. These are checked by all acid things, such as vinegar, butter-milk water of extreme acidity (that is, the thin bitter water which floats upon butter-milk when it is exposed to the sun), and the acid juice of citrons; and still more useful are those things which have an astringency joined to their acidity, such as the juice of unripe grapes, sumach, warted-leaved rhubarb, apples, quinces, and acid pomegranates. . . . Cold water, when it is sipped a little at a time, provokes sweat, and assists the protrusion of the superfluous humours to the surface of the body. Let the patient put on a double shirt, with the upper border closely buttoned; and underneath let there be placed two small basins of boiling water, one before and the other behind him, so that the vapour may come to the whole body except the face; and the skin may be rarefied, and disposed to receive and evaporate the superfluous humours. For when the surface of the body is in this state, the patient is suffused with sweat, which is calculated to cool him and is very beneficial. . . . As soon as the symptoms of the Small-pox appear, we must take especial care of the eyes, then of the throat, and afterwards of the nose, ears and joints, in the way I am about to describe. . . . In order to efface the pock-holes, and render them even with the surface of the body, let the patient endeavour to grow fat and fleshy, and use the bath frequently, and have his body well rubbed. . . . There is a bad and fatal sort of the white and large pustules, viz. those which become confluent and spread, so that many of them unite and occupy large spaces of the body or become like broad circles, and in colour resemble fat. As to those white pustules which are very small, close to each other, hard, warty, and containing no fluid, they are of a bad kind, and their badness is in proportion to the degree of difficulty in their ripening. And if the patient be not relieved upon their eruption, but his condition continues unfavourable after it is finished, it is a mortal sign. And as to those which are of a greenish, or violet, or black colour, they are all of a bad and fatal kind; and when, besides, a swooning and palpitation of the heart come on, they are worse and still more fatal. And when the fever increases after the appearance of the pustules, it is a bad sign; but if it is lessened on their appearance, that is a good sign.

ALBUCASIS, OR ABULCASIM (*circa* 1000 A.D.), *was born at Cordova and wrote a comprehensive work on medicine of which three books are surgical. He owes much to Paulus Aegineta and other Greeks, and his "Surgery" was translated into Latin, Provençal, etc. He devotes one book to the use of the cautery. The MSS. of his works are copiously illustrated with figures of the instruments he used.*

SURGERY OF ALBUCASIS
(Translation from Channing's Latin Edition)

واعلم ان القدح لا يستغني فبه المتعلم عن المشاهده مرات فتّم (لخبنيد)
يقدم على العمل، وقد بلغني عن العراقين انه ذكر انه تصنع بالعراق
مقدحاً منفذاً يمص به الماء ولم ارا احداً في بلدنا صنع ذلك ولا
قراته في كتاب من كتب الاويل وقد يمكن ان يكون ذلك محدثاً،
وهذه صورة انواع عن المقاهح ليقف عليها من جهلها
ان شا الله تعالي.،

صورة مقدح



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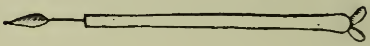

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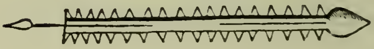


تصنع من النحاس خاصة ويكون طرفاها بهذه الدقة بعينها صلبة
مثلثة الطرف الشكل حادة،

الفصل الرابع والعشرون في علاج اللحم النابت في الانف،

قد تنبت في الانف لحوم مختلفة زايدة منها شي يسمى العقربان
الكثير الارجال ومنها ما يكون لحماً سرطانياً متحجراً كمد
اللون ومنها ما يكون لحماً بيناً غير كمد اللون، فما كان من

Bk. I. Sec. 56. ON CAUTERISATION IN EXCESSIVE BLEEDING FROM A CUT ARTERY.—Very often a flow of blood takes place from an artery cut by accident from outside, or in the opening of an abscess, or burning of a limb, or such like; and it is hard to stop.

Therefore when this has happened to any, hasten with thy hand to the mouth of the artery, and place thy forefinger upon it stopping it well till the blood stay under thy finger, and nothing come from it. Then in the fire set cauteries of an olive shape large or small, many in number, and blow upon them till they be white hot; take then one of them large or small according to the relation and position in which the artery is torn, and place the cautery fairly upon the artery itself, after thou hast quickly removed thy finger. And hold the cautery therein till the blood be stayed. But if it spurt out after thou hast removed thy finger from the opening of the artery and extinguish the cautery, take then quickly another of those that are ready in the fire, nor cease to do this with one cautery after another until the blood is stayed. But have a care lest thou burn a nerve which may be there and so another calamity fall upon the patient. Know moreover when blood flows from an artery, it is not possible that the flow be stayed when the artery is great unless by one of four means: by the cautery in truth as we have said; or by division of that which had not been divided, for when it is divided its ends are drawn together, and the bleeding is broken off; or by firm binding with a thread; or by application of drugs possessed of styptic power with pressure made properly and firmly by the help of folded cloths. But they who try to stay the blood by ties or tight bandages or the application of caustics and the like succeed not altogether or at least but seldom. But if this happen to any when no physician or medicine is at hand, let him hasten to place his finger in the opening of his own wound, as we have written above, and perchance he may close it till the blood clot, and let him pour upon the wound and the artery (from which the finger is not removed) water as cold as possible, till the blood congeal and grow thick. And meantime let him reflect on that which may be necessary whether cautery or drug. May this be pleasing to Allah.

Bk. II. Sec. 23. ON THE CURE OF CATARACT.— . . . Know moreover that it does not suffice for a disciple to be instructed on the depression of a cataract, unless after he has seen that operation many times, then he may betake himself to the work. A certain man of Irak once came to me and said that in Irak the needle is made hollow so that by it the cataract is sucked out. In our country I have never seen it on this wise, nor have I seen it described in any book of the ancients. Perchance it is a new discovery. These then are figures of the kinds of needle, that he who is ignorant may turn to them. May Allah most good, most great, be pleased (*see Illustration in original on opposite page*) . . . Let them be made specially of bronze; and let their ends be of this same fineness, hard, of triangular form, and sharp at the point.

AVICENNA (980–1037 A.D.) *was the most celebrated Arabian philosopher of the Middle Ages. Born in Chorasan he lived at various Persian courts, and his "Canon of Medicine" translated into Latin formed an authoritative work in the West till long after the Renaissance.*

CANON MEDICINAE OF AVICENNA (from a Latin Translation of 1608)

Lib. i. Fen. 3, Doct. 2, Cap. 4. OF FRICTION.—One kind of friction is hard, which enlarges or thickens; another is gentle, which loosens. One is prolonged, which causes thinness; another is moderate, which fattens. When these are combined, corresponding results will be produced. There is also a friction which is rough, as with rough cloths, which quickly draws the blood to the outward parts, and one which is smooth, as with the palm or with soft cloths, which collects the blood and keeps it in the part. Now, the objects of friction are:—the thickening of thin bodies, the hardening of soft ones, the thinning of thick ones, the softening of hard ones. Besides there is a friction of preparation, which comes before exercise, and is begun gently; this, when the desire to rise is felt, braces and hardens. Then there is the friction of restoration, which comes after exercise and is called rest-inducing friction. The object of this is the resolution of superfluities retained in the muscles, not evacuated by exercise, that they may be evaporated, and that fatigue may not occur. This friction must be done smoothly and gently.

Lib. ii. Tract. ii. Cap. 365. OF JABROL.—What is Jabrol? It is the root of the woodland mandrake, or of any kind of mandrake, large and of human shape; on this account it is called mandrake. For mandrake is the name of any natural object, for instance a growing plant, in human shape. It is immaterial whether the meaning of this name was discovered or not, for many names have now meanings which were not at first discovered; moreover, a form of mandrake has been found like spongy wood which is crumbling down like great costus. Nature.—It is cold in the third degree, dry in itself, and it has a slight amount of heat in the opinion of some. The root is strong and drying, while the rind of the root is weak. The dried leaves are also used, though they are sometimes applied moist, and in the mandrake itself there is moisture. Uses and properties.—It is narcotic, it exudes gum, and has juice, but the juice is stronger than the gum. Whoever wishes to have anything cut from his limbs may drink three measures of it in wine: this will produce insensibility.

Lib. iii. Tract. iv. Cap. 2. OF THE SIGNS OF PLEURISY.—The signs of simple pleurisy are quite clear. They are fever invariably present because of the vicinity of the heart. Secondly, a stabbing pain under the ribs, since the membrane is shaggy, and often this is not apparent except when breathing. And sometimes there is tension with stabbing; sometimes this is very great. Tension signifies great extent and stabbing great severity in its penetration. The third sign is difficulty of breathing owing to compression caused by effusion, also the shallowness and frequency of breathing. The fourth is a saw-like pulse. The difference from the usual condition of the pulse is increased by the want of strength and the extent of the cause. The fifth sign is cough; sometimes the cough at the beginning of this illness is dry, and later with sputum; and whenever the cough is with sputum at the beginning it is matter for congratulation. The cough, however, does not occur unless the lung is affected by its proximity.

HALY ABBAS (*circa* 980) *was physician to the Emir Adhad-ed-Daula, who founded a public hospital in Bagdad.*

LIBER CONTINENS OF HALY ABBAS (from a Latin Translation of 1523)

ON PRECAUTIONS AGAINST PESTILENTIAL DISEASES.—Since certain pestilential diseases arise from putrid vapours infecting the air, as vapours set free from the bodies of dead men and beasts, and likewise from water into which vegetables and much putrefied fruit have fallen, it is necessary, in addition to what has been said regarding the purification of the body and the regimen which counteracts its disorders, to depart from the district and locality in which those things occur, if that is possible. But if your dwelling be to the lee of winds which blow over these putrid things, or in caves with little moisture, or in houses through which but little air passes, you will sprinkle it with vinegar, strew it with myrtle and cool scents, and fumigate the place where you dwell with pleasant vapours such as wood-aloes, myrrh, sandal-wood, camphor, etc. If you fumigate it also with frankincense and sandarach it is very useful; multiply also cool and pleasant scents. Whosoever will be freed from pestilent diseases must be guided by this method. Moreover there is an observation upon infectious diseases like leprosy, scabies, phthisis, madness, small-pox, ophthalmia, and the like, since diseases of this sort pass to him who dwells with the sick man, let not one stay long with them, nor dwell in the same house as the sick, but let him go far off to places which are to the lee of winds that blow over them. And this collection of rules is useful for the man whose mind is fixed to save himself from pestilence and infectious disease, and that which has been said let it suffice.

"REGIMEN SANITATIS" *or* "SCHOLA SALERNITANA" *is the name of a Latin poem dedicated to Robert, son of William the Conqueror, who stayed at Salerno in the year* 1099. *It was composed by the teachers of that Medical School, then in its prime; and its maxims were constantly quoted by subsequent medical writers.*

REGIMEN SANITATIS SALERNITANUM

1–21. Anglorum Regi scripsit schola tota Salerni.
Si vis incolumem, si vis te reddere sanum,
Curas tolle graves, irasci crede profanum,
Parce mero, coenato parum, non sit tibi vanum
Surgere post epulas, somnum fuge meridianum,
Non mictum retine, nec comprime fortiter anum:
Haec bene si serves, tu longo tempore vives.
  Si tibi deficiant medici, medici tibi fiant
Haec tria, mens laeta, requies, moderata diaeta.
  Lumina mane manus surgens gelida lavet aqua,
Hac illac modicum pergat, modicumque sua membra
Extendat, crines pectat, dentes fricet. Ista
Confortant cerebrum, confortant caetera membra.
Lote, cale: sta, pranse, vel i; frigesce, minute.
  Sit brevis aut nullus tibi somnus meridianus.
Febris, pigrities, capitis dolor, atque catarrhus,
Haec tibi proveniunt ex somno meridiano.
  Quatuor ex vento veniunt in ventre retento,
Spasmus, hydrops, colica, vertigo, quatuor ista.
  Ex magna coena stomacho fit maxima poena.
Ut sis nocte levis, sit tibi coena brevis.
29–30.   Ova recentia, vina rubentia, pinguia jura,
Cum simila pura, naturae sunt valitura. . . .
135–137.   Grossos humores nutrit cerevisia, vires
Praestat, et augmentat carnem, generatque cruorem,
Provocat urinam, ventrem quoque mollit et inflat. . . .
197–198.   Crapula discutitur, capitis dolor, atque gravedo,
Purpuream dicunt violam curare caducos. . . .
199–205.   Aegris dat somnum, vomitum quoque tollit adversum,
De Urtica. Compescit tussim veterem, colicisque medetur,
Pellit pulmonis frigus, ventrisque tumorem,
Omnibus et morbis subveniet articulorum.
  Hyssopus est herba purgans a pectore phlegma.
Ad pulmonis opus cum melle cognatur hyssopus:
Vultibus eximium fertur reparare colorem. . . .
212–213.   Cum vino choleram nigram potator repellit:
De Pulegio. Sic dicunt veterem sumptum curare podagram. . . .
219–221.   Auribus infusus vermes succus necat ejus.
De Salice. Cortex verrucas in aceto cocta resolvit.
Pomorum succus flos partus destruit ejus. . . .
310–311.   Hi sunt tres menses, Maius, September, Aprilis,
In quibus eminuas ut longo tempore vivas.

THE SALERNIAN REGULATION OF HEALTH

The whole school of Salernum wrote to the king of the English :—If you desire to make yourself safe and healthy, get rid of anxious cares, believe it vulgar to get angry, abstain from wine, sup in moderation, let it not seem useless to rise up after a feast, avoid a noonday sleep, do not retain the urine, don't become costive. If you attend well to these, you will live a long time. If you lack doctors, these three may be your doctors—a joyful disposition, rest, a well-regulated diet. Let the riser in the morning bathe his eyes and hands in cold water, let him go gently this way and that, and gently stretch his limbs, then comb his hair, and brush his teeth. These things strengthen the brain, and strengthen all the limbs. When you have bathed, get warmed ; having dined, stand up or walk about ; if you have been bled, keep cool. Let your mid-day sleep be short or none at all. Fever, lethargy, headache, catarrh—these all arise from mid-day sleep. Four things proceed from wind retained in the belly—gripes, dropsy, colic, giddiness. A heavy supper causes much pain to the stomach.

Fresh eggs, red wines, thick soups, with plain bread, these are nature's nutriments. . . .

Beer produces thick humours, gives strength, increases flesh, makes blood, provokes urine, and softens and swells the belly. . . .

Intoxication, headache, catarrh are dispelled by the purple violet, which is said also to cure epileptics. . . .

(The nettle) gives sleep to the sick, removes troublesome vomiting, checks an old cough, cures colic, banishes cold of the lung and swelling of the belly, and is of assistance in all diseases of the joints. Hyssop is a herb which clears phlegm from the chest. A concoction of hyssop with honey is of use to the lungs : it is said to restore an excellent colour to the face. . . .

(Pennyroyal) drunk with wine drives out black bile ; taken thus it is said to cure long-standing gout. . . .

(Willow) is an infusion for the ears : its juice kills worms : a decoction in vinegar softens warts. The juice of its fruit and its flower prevent childbearing. . . .

These are the three months—May, September, April—in which you may be bled, if you wish to live long.

ARNALD OF VILLANOVA (*circa* 1240–1300 A.D.), *one of the early Montpellier School, wrote a treatise on "Praxis Medicinalis." He was physician to several Popes at Avignon, was one of the first to introduce ideas of chemistry into medicine, and is distinguished by his rationalism.* (*From a printed edition of* 1586.)

PRAXIS MEDICINALIS

REGIMEN PODAGRAE.—Regimen sit tale: Primo cavebitis a comestione omnium leguminum & castanearum: brodio tamen uti poteritis, maxime cicerum, & pisorum, licet raro: item cavebitis a cibis factis de pasta: . . . item cavebitis a vino novo. . . . Item a carnib. leporinis & bovinis antiquis. . . . Sciendum quod si dolor non sedaretur cum praedictis, & sic esset intensus, quod amplius patiens tollerare non posset, in tali casu manifeste necessario isto esset utendum: Recipe opii, corticis radicis mandragorae an. ℥i, molliter confice cum aqua portulacae, lactucae, vel hyoscyami, et informentur grana, & cum opus fuerit, dissolve ex istis granis cum aqua lactucae, vel portulacae, vel aliis succis frigidis, & utere. Verumtamen, si dolor fuerit ita fortis, quod istis medicinis non sedetur, unge locum cum aceto fortissimo calido.

ARNALD OF VILLANOVA, PRACTICE OF MEDICINE

TREATMENT OF GOUT.—This is the treatment: first you will avoid eating all vegetables and chestnuts; but you may use a broth of chick-pease and occasionally of peas; also you will avoid food made of pastry . . . also new wine. . . . Also the flesh of hares and old cattle. . . . You must know that if the pain is not settled by the aforesaid remedies, and if it is so intense that the patient cannot bear it longer, in such case the evident necessity is to use: ℞ Opium, and mandrake-root-bark of each one ounce; soften with water of purslain, or lettuce or henbane, forming grains; and when need arises dissolve some of these grains with lettuce or purslain water or other cold juices, and use. However, if the pain is so strong that it is not settled with these remedies, apply to the part the strongest hot vinegar.

AVERROËS (1126–1198 A.D.), *born at Cordova, was distinguished chiefly for his writings on philosophy and religion. His chief medical work, the "Colliget," is largely drawn from Galen.*

COLLIGET OF AVERROËS (from a Latin Translation of 1540)

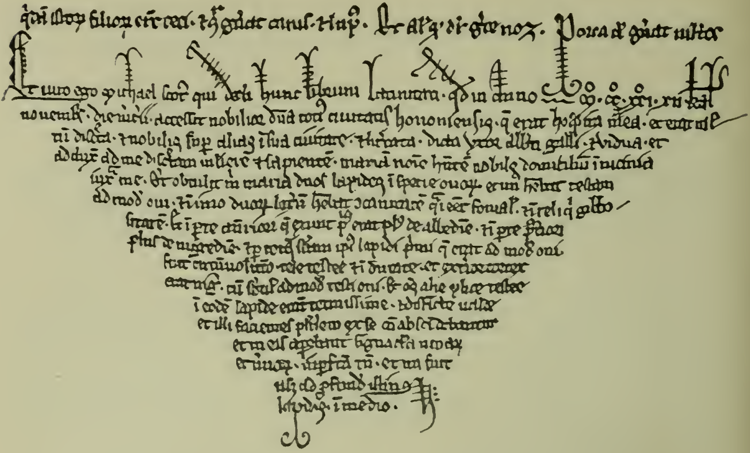
Lib. I. Chap. xii., which is on humours. Now the humours which appear in the human body are four: to wit, blood, phlegm, yellow bile, and black bile.

Chap. xiiii., which is on spirit. There are two spirits, one appearing in the heart, the other in the brain: but a spirit in the liver is not evident to the senses.

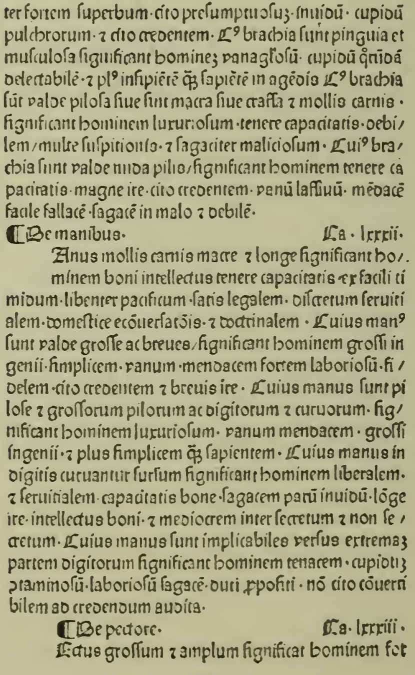
Lib. V. Chap. xiii., which is on medicines that soothe pain. The first method, then, of soothing pain is to remove the cause of pain; the second to stupefy the part so that it does not feel pain, as happens with opium; the third kind of medicine is that which produces something in the part to overcome the cause of pain, and this is the true soother. Under the first head fall many kinds of medicines, as purgative and digestive medicines. The second method does not truly relieve the pain but merely takes away the feeling of the part and hardens it—a method not to be used unless we are unable to avoid it as has been mentioned in the book "on the nature of health." But the third is the true soother, for it produces immediately that which resists the cause of pain.

Chap. xlii. Licorice is moist in the first degree, and exceeds a little in heat a moderate constitution. S. has said that it is like the human constitution; and the sweetness of its vapour, and a slight stypticity show this. Also a moderate sweetness signifies heat and moisture. Its stypticity takes away part of its heat and moisture, except when it simply removes more of the moisture. It softens the roughness which is in the trachea and bladder and that of other parts liable to roughness.

MICHAEL SCOT. Facsimile of Scot MS. in Gonville and Caius College Library, by kind permission of the Master. (Slightly reduced.)



LIBER PHISIONOMIAE (early printed Edition of 1497; about two-thirds).



ter fortem ſuperbum·cito preſumptuoſuʒ·inuidū· cupidū
pulchrorum·ꝛ cito credentem· Cꝰ brachia ſunt pinguia et
muſculoſa ſignificant homineʒ vanaglorioſū· cupidū q̃nīdá
delectabilē·ꝛ plꝰ inſipiētē q̃ʒ ſapiētē in agēdis Cꝰ brachia
ſūt valde piloſa ſiue ſint macra ſiue craſſa ꝛ mollis carnis·
ſignificant hominem luxurioſum·tenere capacitatis·debi/
lem/multe ſuſpitionis·ꝛ ſagaciter malicioſum·Cuiꝰ bra/
chia ſunt valde nuda pilis/ſignificant hominem tenere ca
pacitatis·magne ire·cito credentem·vanū laſciuū·mēdacē
facile fallacē·ſagacē in malo ꝛ debilē·

¶ De manibus· Ca·lxxxii·

Anus mollis carnis macre ꝛ longe ſignificant ho/
minem boni intellectus tenere capacitatis ex facili ti
midum·libenter pacificum·ſatis legalem·diſcretum ſeruiti
alem·domeſtice ecōuerſatōis·ꝛ doctrinalem·Cuius manꝰ
ſunt valde groſſe ac breues/ſignificant hominem groſſi in
genii·ſimplicem·vanum·mendacem fortem laborioſū·fi/
delem·cito credentem ꝛ breuis ire·Cuius manus ſunt pi
loſe ꝛ groſſorum pilorum ac digitorum ꝛ curuorum·ſig/
nificant hominem luxurioſum·vanum mendacem·groſſi
ingenii·ꝛ plus ſimplicem q̃ʒ ſapientem·Cuius manus in
digitis curuantur ſurſum ſignificant hominem liberalem·
ꝛ ſeruitialem·capacitatis bone·ſagacem parū inuidū·lōge
ire·intellectus boni·ꝛ mediocrem inter ſecretum ꝛ non ſe/
cretum·Cuius manus ſunt implicabiles verſus extremaʒ
partem digitorum ſignificant hominem tenacem·cupidūʒ
ꝯtaminoſū·laborioſū ſagacē·duri ꝓpoſiti·nō cito cōuerti
bilem ad credendum audita·

¶ De pectore· Ca·lxxxiii·

Ectus groſſum ꝛ amplum ſignificat hominem fot

MICHAEL SCOT (*circa* 1175–1230 A.D.) *was after his lifetime celebrated as a magician. He was tutor and friend of the Emperor Frederick II., for whom he translated Arabic versions of Aristotle's works and the Commentaries of Averroës into Latin. He wrote also a manual upon "Urines" and a work upon the art of "Physiognomy" which was much cultivated at that time. He forms one of the connecting links between the Arab learning and the* 13*th-century Pre-renaissance of the West.*

Marginal Note in a 13*th-century MS. of Scot's Translation of Aristotle's "History of Animals," giving the Clinical Record of a Case (probably a calcified fibroid tumour).*

I, Michael Scot, who put this book into Latin, declare that in the year 1221 on the first of November a very noble lady of the State of Bologna who was my hostess, the widow of Albertus Gallus, discreet, noble above other ladies in her town and learned, brought to me a discreet and wise woman named Mary, dwelling in a fine house of the neighbourhood. Mary showed me two stones like eggs. . . . And the stone compared with its bulk was very light, and among all its pores appeared a passage of veins and sinews, and it was whiter on cutting into. And it was possible to cut the stone with a knife, and between the outer layer like an eggshell and the inner pores was, as it were, a meal of powdered chalk, and that stone came from the womb of the said Mary on the first of July of the same year. And on the eighth day of July another stone of the same kind came out and of the same weight according to its bulk, for it was somewhat smaller, of darker colour and compressed on each side. And it seemed to the said Mary that for eight years before the passage of these stones the tumour was constantly lessening somewhat. And on the said stones were no furrows as in stones from the kidneys or bladder; and between the projections were signs of white skin, which you find to be due to its long duration. The said Mary consulted me on account of difficulty in urination.

PHYSIOGNOMY

Chap. 82. ON THE HANDS.—Hands of soft flesh, slender and long, show a man of good intellect but little strength, easily frightened, gladly peaceful, pretty formal, discreetly obliging, of domestic habits, and erudite. Hands that are very thick and short show a man of slow intelligence, simple, vain, lying, strong, hard-working, faithful, credulous, and good-tempered. Hairy hands with strong hair and curved fingers show a man wanton, vain, lying, of slow intelligence, and more simple than wise. Hands with fingers curved backward show a man liberal and obliging, of good strength, sagacious, little envious, wrathful, of good intellect, and moderately secretive. Hands with fingers stiff at the ends show a man persistent, viciously acquisitive, hard-working, sagacious, of set purpose, not quickly persuaded to believe what he hears.

BERNARD DE GORDON (*circa* 1300 A.D.) *was Professor in Montpellier from* 1285, *and wrote the* "*Lilium Medicinae*," *which was a popular text-book for two centuries. He appears to describe syphilis along with leprosy, and shows much Arabian influence. Tradition reports him to have been of Scotch extraction.* (*From a printed edition of* 1550.)

LILIUM MEDICINAE

Par. I. Cap. xxii. DE LEPRA.—Lepra est morbus consimilis corrumpens figuram & formam & compositionem membrorum, & finaliter soluens continuum, proveniens de materia melancholica sparsa ad totum corpus. . . . Signa infalibilia sunt ista, depilatio superciliorū & grossities eorum, rotunditas oculorū, dilatatio nariū exterius & coarctatio interius cum difficultate anhelitus, & quasi si cum naribus loqueretur, & color faciei lucidus, vergens ad fuscedinem mortificatam, & terribilis aspectus faciei cum fixo intuitu, & cū gracilitate contractione pulparū aurium. . . .

Cap. xxiii. DE MORPHEA.—Morphea est cutis defoedatio maculosa. Intelligendum est, quod omnia illa quae sunt causae leprae, sunt causa morpheae, unde quod est lepra in carne, est morphea in cute.

Par. II. Cap. xxv. DE EPILEPSIA.—Cū aliquis est in paroxysmo, si aliquis ponit os supra aurē patientis, & dicat ter istos 3 versus proculdubio statim surgit:

Gaspar fert myrrhum, thus Melchior, Balthasar aurum;
Haec tria qui secum portabit nomina regum,
Solvitur a morbo Christi pietate caduco.

DE PROGNOSTICIS.—Modus autem generationis apostematum est iste, cū magnae venae sunt plenae, deinde parvae & capillares; tunc quia san. in venis contineri non potest aperiuntur violenter orificia venarū, tunc sang. exit & resudat ad porositates membrorum & loca debilia, tunc si san. temperatus est in qualitate & quantitas eius est pauca, & virtus eius est fortis, tunc potest rectificari, aut quandoque assimilando & evaporando sic quod non generabit apostema. Si autem sit nimiae quantitatis aut malae qualitatis tunc non potest corrigi, sed congregatur materia in loco debili & causat apostema. . . . Modus autem generationis apostematis choleri est sicut de sanguine, & ita de aliis humoribus.

Bernard Gordon's *Lily of Medicine*

On Leprosy.—Leprosy is a disease corrupting the shape and form and the substance of the members, and finally breaking them up, arising from melancholic matter scattered throughout the whole body. . . . The infallible signs are these, loss of hair on the eyebrows and thickening of them, roundness of the eyes, dilatation of the nostrils outwardly and narrowing within causing difficulty in breathing, and as it were speaking by the nostrils, and the colour of the face shining white turning to the darkness of mortification, and a terrible appearance of the face with fixed gaze and with wasting and shrinking of the pulp of the ears. . . .

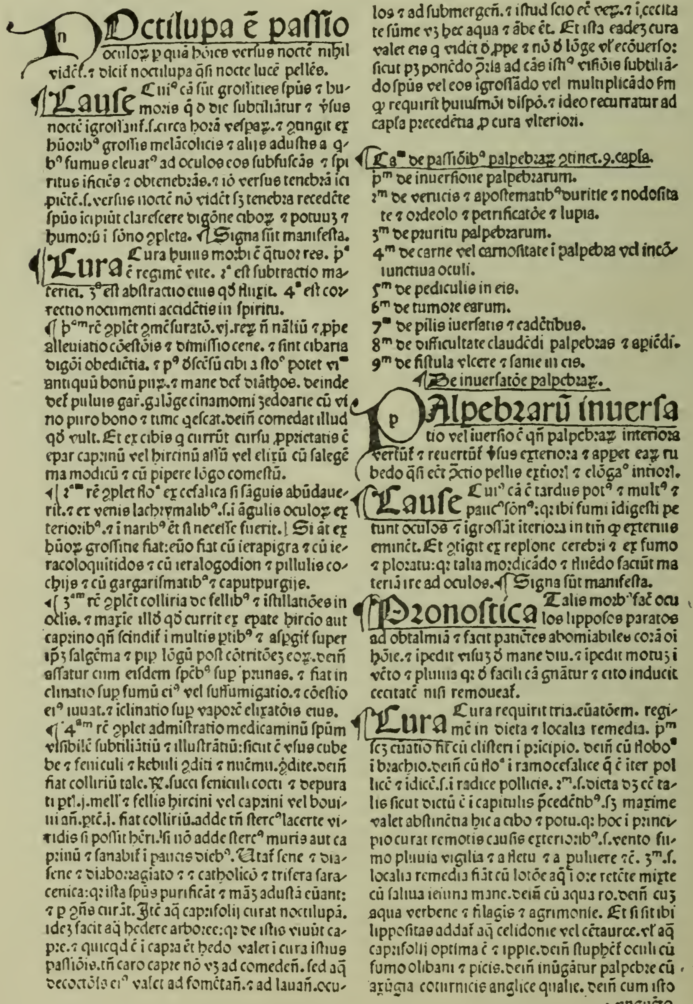
On Morphea.—Morphea is a spotted impurity of the skin. It must be understood that all those things that are causes of leprosy are causes of morphea, wherefore what is leprosy in the flesh is morphea in the skin.

On Epilepsy.—When one is in a fit, if one places the mouth over the ear of the patient, and says thrice these three lines, without a doubt he will forthwith rise up:

(*Charm.*)

On Prognostics.—The mode of origin of abscesses is this: the large veins are filled with blood next the small ones, then the hair-like ones; and because the blood cannot be held in the veins their orifices are opened violently, the blood passes out and sweats at the pores of the members and the weak places; if the blood is moderate in quality and small in amount, and if its virtue is great, then it may be healed or sometimes through assimilation and evaporation it does not produce an abscess. But if it is of too great quantity or of bad quality, it cannot be put right, but matter collects in the weak place and causes an abscess. . . . But the mode of origin of bile abscess is similar to that of one caused by blood, and so with the other humours.

JOHN OF GADDESDEN (*circa* 1310 A.D.), *physician to Edward III. and Professor of Medicine at Merton College, Oxford, wrote the "Rosa Anglica Practica Medicinae a capite ad pedes." It is a learned practical work on medicine, well arranged, each disease being dealt with under the heads of Causes, Symptoms, Cure, etc., but it contains many somewhat fatuous prescriptions. He is the reputed prototype of Chaucer's Doctour of Physik.* (*From an early printed edition of* 1492; *about two-thirds.*)



NOctilupa ẽ paſſio oculoꝝ ꝑ quã hõies verſus noctẽ nihil vidẽt. ⁊ dicit noctilupa q̃ſi nocte lucẽ pellẽs.

¶ Cauſe. Cuiꝰ cã ſũt groſſities ſpũs ⁊ humoris q̃ ꝺ die ſubtiliãtur ⁊ verſus noctẽ igroſſãt. ſ. circa horã veſpaꝝ. ⁊ ꝯtingit ex hũoꝛibꝰ groſſis melãcolicis ⁊ aliis aduſtis a q̈bꝰ fumus eleuatꝰ ad oculos eos ſubfuſcãs ⁊ ſpiritus ĩficiẽs ⁊ obtenebrãs. ⁊ iõ verſus tenebrã icipiẽt. ſ. verſus noctẽ nõ vidẽt ſꝫ tenebra recedẽte ſpũs icipiũt clareſcere digõne ciboꝝ ⁊ potuuꝫ ⁊ humoꝛũ i ſõno ꝯpleta. ¶ Signa ſũt manifeſta.

¶ Cura. Cura huius moꝛbi ẽ q̃tuoꝛ res. pª ẽ regimẽ vite. 2ª eſt ſubtractio materiei. 3ª eſt abſtractio eius qð fluxit. 4ª eſt correctio nocumenti accidẽtis in ſpiritu.

¶ Pᵒᵐ rẽ ꝯplẽt ꝯmẽſuratõ. vj. reꝝ ñ nãliũ ⁊ ꝓpe alleuiatio cõeſtõis ⁊ dimiſſio cene. ⁊ ſint cibaria digõi obedictia. ⁊ pꝰ ꝺſcẽſũ cibi a ſtoᵒ potet viᵐ antiquũ bonũ puꝝ. ⁊ mane dẽt diãthos. deinde dẽt puluis gar. galãge cinamomi ʒedoarie cũ vino puro bono ⁊ tunc q̇eſcat. deiñ comedat illud qð vult. Et ex cibis q̇ currũt curſu ꝓprietatis ẽ epar caprinũ vel hircinũ aſſũ vel elixũ cũ ſalgẽma modicũ ⁊ cũ pipere lõgo comeſtũ.

¶ 2ᵐ rẽ ꝯplet fleᵒ ex ceſalica ſi ſãguis abũdauerit. ⁊ ex venis lachrymalibꝰ. ſ. i ãgulis oculoꝝ exterioꝛibꝰ. ⁊ i naribꝰ ẽt ſi neceſſe fuerit. Si ãt ex hũoꝝ groſſitie fiat: eũo fiat cũ ierapigra ⁊ cũ ieracoloquitidos ⁊ cũ ieralogodion ⁊ pillulis cochijs ⁊ cũ gargariſmatibꝰ ⁊ caputpurgijs.

¶ 3ᵐ rẽ ꝯplẽt colliria de fellibꝰ ⁊ iſtillatiões in oclis. ⁊ maxie illð qð currit ex epate hircio aut caprino qñ ſcindit i multis ꝑtibꝰ ⁊ aſꝑgit ſuper ipꝫ ſalgẽma ⁊ pip lõgũ poſt cõtritõeꝫ eoꝝ. deiñ aſſatur cum eiſdem ſpẽbꝰ ſup prunas. ⁊ fiat inclinatio ſup fumũ eiꝰ vel ſuffumigatio. ⁊ cõeſtio eiꝰ iuuat. ⁊ iclinatio ſup vapoꝛẽ elixatõis eius.

¶ 4ᵐ rẽ ꝯplet admiſtratio medicaminũ ſpũm viſibilẽ ſubtiliãtiũ ⁊ illuſtrãtiũ: ſicut ẽ vſus cubebe ⁊ feniculi ⁊ kebuli ꝯditi ⁊ nucmu. ꝯdite. deiñ fiat colliriũ tale. ℞. ſucci feniculi cocti ⁊ depurati ꝑt. j. mell' ⁊ fellis hircini vel caprini vel bouini añ. ꝑtẽ. j. fiat colliriũ. adde tñ ſtercꝰ lacerte viridis ſi poſſit hẽri. ſi nõ adde ſtercꝰ muris aut caprinũ ⁊ ſanabit i paucis diebꝰ. Vtat ſene ⁊ diaſene ⁊ diaboꝛagiato ⁊ ⁊ catholicõ ⁊ triſera ſaracenica: q: iſta ſpũs purificãt ⁊ mãꝫ aduſtã eũant: ⁊ ꝑ ꝯñs curãt. Itẽ aq̃ capꝛifolij curat noctilupã. ideꝫ facit aq̃ hedere arboꝛee: q: de iſtis viuũt capꝛe. ⁊ quicq̇d ẽ i capꝛa ẽt hedo valet i cura iſtius paſſiõis. tñ caro capre nõ vꝫ ad comedeñ. ſed aq̃ decoctõis eiꝰ valet ad fomẽtañ. ⁊ ad lauañ. oculos ⁊ ad ſubmergeñ. ⁊ iſtud ſcio eẽ veꝝ. ⁊ i cecitate ſũme vꝫ hec aqua ⁊ ãbe ẽt. Et iſta eadeꝫ cura valet eis q̇ vidẽt ꝺ ꝓpe ⁊ nõ ꝺ lõge vl' ecõuerſo: ſicut pꝫ ponẽdo ꝯ̃ria ad cãs iſtiꝰ viſiõis ſubtiliãdo ſpũs vel eos igroſſãdo vel multiplicãdo ſm q̄ requirit huiuſmõi diſpõ. ⁊ ideo recurratur ad capl'a precedẽtia ꝓ cura vlterioꝛi.

¶ Ca 8ᵐ de paſſiõibꝰ palpebraꝝ ꝯtinet. 9. capl'a.

pᵐ de inuerſione palpebrarum.
2ᵐ de verucis ⁊ apoſtematibꝰ duritie ⁊ nodoſitate ⁊ oꝛdeolo ⁊ petrificatõe ⁊ lupia.
3ᵐ de pruritu palpebrarum.
4ᵐ de carne vel carnoſitate i palpebra vel incõiunctiua oculi.
5ᵐ de pediculis in eis.
6ᵐ de tumoꝛe earum.
7ᵐ de pilis iuerſatis ⁊ cadẽtibus.
8ᵐ de difficultate claudẽdi palpebras ⁊ apiẽdi.
9ᵐ de fiſtula vlcere ⁊ ſanie in eis.

¶ De inuerſatõe palpebraꝝ.

PAlpebrarũ inuerſatio vel iuerſio ẽ qñ palpebraꝝ interioꝛa vertũt ⁊ reuertũt ꝟſus exterioꝛa ⁊ appet eaꝝ rubedo q̃ſi eẽt ꝯ̃ctio pellis extioꝛ ⁊ elõgaꝰ intioꝛ.

¶ Cauſe. Cuiꝰ cã ẽ tardus potꝰ ⁊ multꝰ ⁊ paucꝰ ſõnꝰ: q: ibi fumi idigeſti petunt oculos ⁊ igroſſãt iterioꝛa in tñ q̄ exterius eminẽt. Et ꝯtigit ex replõne cerebri ⁊ ex fumo ⁊ ploꝛatu: q: talia moꝛdicãdo ⁊ fluẽdo faciũt materiã ire ad oculos. ¶ Signa ſũt manifeſta.

¶ Pronoſtica. Talis moꝛbꝰ facit oculos lippoſos paratos ad obtalmiã ⁊ facit paciẽtes abomiabiles coꝛã oĩ hõie. ⁊ ipedit viſuꝫ ꝺ mane diu. ⁊ ipedit motuꝫ i vẽto ⁊ pluuia q: ꝺ facili cã gnãtur ⁊ cito inducit cecitatẽ niſi remoueat.

¶ Cura. Cura requirit tria. eũatõem. regimẽ in dieta ⁊ localia remedia. pᵐ ſcꝫ eũatio fit cũ cliſteri i pꝛicipio. deiñ cũ fleboᵐ i brachio. deiñ cũ fleᵒ i ramoceſalice q̃ ẽ iter pollicẽ ⁊ idicẽ. ſ. i radice pollicis. 2ᵐ. ſ. dieta dꝫ eẽ talis ſicut dictũ ẽ i capitulis ꝓcedẽtibꝰ. ſꝫ maxime valet abſtinẽtia hic a cibo ⁊ potu. q: hoc i principio curat remotis cauſis exterioꝛibꝰ. ſ. vento fumo pluuia vigilia ⁊ a fletu ⁊ a puluere ⁊c̃. 3ᵐ. ſ. localia remedia fiãt cũ lotõe aq̃ i oꝛe retẽte mixte cũ ſaliua ieiuna mane. deiñ cũ aqua ro. deiñ cuꝫ aqua verbene ⁊ filagis ⁊ agrimonie. Et ſi ſit ibi lippoſitas addat aq̃ celidonie vel cẽtaurce. vl' aq̃ capꝛifolij optima ẽ ⁊ ipp̃ie. deiñ ſuphẽt oculi cũ fumo olibani ⁊ picis. deiñ inũgatur palpebꝛe cũ axũgia coturnicis anglice qualie. deiñ cum iſto

vngucto

ROSA ANGLICA

NOCTILUPA is a disease of the eyes by which men see nothing towards nightfall, and it is called *noctilupa* from *nocte lucem pellens.*

CAUSES of this are a thickening of the mucus and humor which by day are refined, and become thickened towards night, to wit about the hour of evening. And it arises from humors thick, melancholic, and otherwise burned up, from which the fumes arise to the eyes making them dusky, and infecting and darkening the spirit. Thus towards the onset of the dark or towards night they do not see, but, when darkness departs, the mucus begins to clear by digestion of the food and drink and humors completed during sleep. SYMPTOMS are evident.

CURE.—The cure of this disease consists in four things. 1st is the regulation of the life. 2nd is the withdrawal of the cause. 3rd is the removal of that which flows. 4th is the correction of the injury done to the spirit. . . .

2nd. This is effected by phlebotomy of the cephalic vein if there is excess of blood and from the lachrymal veins at the angle of the eyes outside, or in the nostrils if this be necessary. . . . 4th. This is effected by administration of medicines which refine and clear up the visible mucus, as by the use of cubebs and fennel and seasoned kebuli and fir-cones. Prepare and then let this eye-salve be made: ℞ Fennel juice boiled and purified, 1 part; honey, 1 part; buck-, or goat-, or ox-bile 1 part. Make an eye-salve; add then the faeces of a green lizard if it can be had; if not, add the faeces of a mouse or of a goat, and it will be cured in a few days. . . .

[SPASM IN CHILDREN is thus cured. ℞ of lily roots 1 handful, of anise ℥j, of crocus ʒij; let all be ground and mixed with boiled honey and let a plaster first be made. Then let (the child) be bathed with a decoction of these herbs, ℞ of chamomile and melilot of each 1 handful, of fenugreek 5 pounds, let them be boiled in water and made into a bath. And on coming out of the bath, let all the joints be anointed with warmed oil of chamomile, and then let the said plaster be applied. Let not (the child) drink wine nor fill itself to repletion; but older children may, after purgation, drink old wine in small quantity which relieves spasm of this sort.]

GUY DE CHAULIAC (*circa* 1290–1370 A.D.) *was the most distinguished surgeon of the Middle Ages. He studied in Paris, Montpellier, and Bologna, practised most of his life in Avignon, and wrote there his "Surgery" and other works.*

GUIDONIS DE CAULIACO CHIRURGIA

CAP. UNIVERSALE.—Et ego Guido de Cauliaco, chirurgus, magister in medicina . . . vidi operationes multas, & multa scripta praedictorum, praecipue galeni, quia quot reperiebantur libri in utraque translatione habui, et eos cum diligentia qua potui studui, & per multa tempora operatus fui in multis partibus, & nunc eram in Avinione, anno domini millesimo tercentesimo sexagesimo tertio. . . .

TRACT. DE ANATOMIA.—Chirurgi ignorantes anatomiam, peccant multoties in incisionibus nervorum et colligationum.

Tract. VI. Cap. viii. DE MEMBRIS AMPUTANDIS.—Maior est mors totius corporis ut dicit Albuca: quā defectus mēbri. Incidatur ergo, et locus abscissionis ligetur: si corruptio pertingeret usq; prope iuncturā, incidatur in iunctura cū rasorio, et aliis instrumētis, sive serratione. Si autē non est prope iuncturā, sed elōgatur ab ea; incidatur supra corruptū aliquātulū in loco in quo cū tēta intromissa invenit firmitudinē et dolorē. Et serretur os cū subtili serra. Et modus est quod involvatur membrū a parte sana, & a parte corrupta cū ligamentis: & teneatur firmiter per ministros: & separetur caro que est inter duo ligamenta cū rasorio, donec videatur os totaliter a carne liberatū. Et post muniātur labia cum panno, ut nō laedantur a serra. Et tunc serretur os subtiliter, & perfecte & mēbro separato cauterizetur sanum cum ferro ignito ad hoc apto, aut cum oleo ferventi, ut dictū est: et ligetur: et reliqua ulcerū curatione curetur. . . . Nōnulli vero, ut Theodo. medicinas obdormitativas, ut non sentiatur incisio dictant, velut est opiū, succus morellae, hyoscyami, mandragorae, hederae arboreae, cicutae, lactucae. Et imbibunt in eis spongiā novā, & permittunt eā ad solem exiccari: & quando erit necesse mittunt illā spongiā in aqua calida, & dant eam ad odorandum tantum usquequo capiat somnū. Et ipso obdormitato faciūt operationem. . . .

Ego autem in tali membri mortificatione intercepta ambulatione corruptionis cum scarificationibus & arsenico & ponendo defensivum super partem sanam de bolo armeno, & aliis opportunis: involvo totum membrum mortificatum cum sparadrapo infrascripto multipliciter: & ligo ipsum: & praeparo suo modo, ut dicetur de corporibus mortuorum servandis. Et sic eum retineo quousque iunctura sit aequiliquata, & membrum per se cadat: quia honestius est medico quod cadat per se, quam si incideretur: semper enim quando inciditur, remanet rancor & cogitatio in patiente quod posset remanere.

GUY DE CHAULIAC'S "SURGERY"

GENERAL CHAPTER.—I, Guy de Chauliac, surgeon, master in medicine . . . have seen many operations and many writings of those I have mentioned, especially of Galen, because I possessed whatever books were found in either translation and studied them with all possible diligence, and I operated long in many regions till now I was in Avignon, in the year of grace 1363. . . .

TREATISE ON ANATOMY.—Surgeons ignorant of anatomy make many mistakes in cutting nerves and ligaments.

Treatise VI. Chap. viii. ON AMPUTATION OF LIMBS.—Death of the whole body is of greater import than the loss of a limb, as Abulcasim says. Therefore let it be cut and the place of amputation be bound. If the gangrene reaches nearly to a joint let the cutting be made at the joint with the knife and other instruments or by sawing. If however it is not near a joint, but at a distance, let the cut be made somewhat above the gangrene at a place where the probe being introduced finds the tissues firm and sensitive. And let the bone be sawn with a fine saw. The method is as follows :—The limb is wrapped round at the healthy part and also at the diseased part with bandages, and is held firmly by assistants ; the flesh between the two bandages is divided with the knife until the bone appears completely freed from flesh. Then the surfaces are covered with a cloth that they may not be injured by the saw, the bone is sawn accurately and completely, and the member being separated the healthy part is burned with a glowing iron adapted for the purpose or with boiling oil, as has been said ; is bandaged and receives the further treatment proper to ulcers. . . . Now some, like Theodoric, recommend soporific drugs, that the cut may not be felt, like opium, and the juice of morella, henbane, mandrake, ivy, hemlock, and lettuce. They soak a new sponge in these and let it dry in the sun. And when needed they put the sponge in warm water and give it to smell till sleep comes, and the patient having fallen asleep they do the operation. . . .

But I, in such a mortification of a limb after the advance of the gangrene has been stopped by scarifications and arsenic and application of a protective of bolus armenius and other things proper to the sound part, wrap the whole mortified limb many times round with the sticking plaster described later, and bandage it, and I prepare it after the manner mentioned for preservation of the dead. Thus I keep it till the joint is half wasted and the member falls off by itself ; because it is more credit to the physician that it should fall off than if it was cut off ; for when it is cut there always remains a grudge and a reflection on the part of the patient that it might have been left.

JOHN OF VIGO, *writing about* 1500, *gave the first description of syphilis as a separate disease. It is a debated question whether the disease simply attracted notice at this period, or whether it had been introduced by followers of Columbus from America discovered in* 1492.

JOANNIS DE VIGO

EX LIBRO QUINTO PRACTICAE CHIRURGICAE.—Anno millesimo quadringentesimo nonagesimo quarto de mense Decembris: quo anno Serenissimus Carolus Francorum Rex magna comitante caterua uersus Italiae partes iter accepit ad regnum Neapolitanum recuperandū, Apparuit quoddam morbi genus quasi per totā Italiam incognitae naturae: quem uariis & diuersis nominibus diuersae nationes appellarunt. Galli utiq; morbū Neapolitanum nominarunt, quia eodem tempore dicunt ipsum morbum Neapoli in Galliam se in suo ipsorum reditu transtulisse. Neapolitani uero quia dicto anno per totam Italiam hic morbus diffusus & manifestatus fuit, ideo morbum Gallicum nuncuparunt. . . . Fuit praeterea, & adhuc est, morbus praefatus contagiosus, praesertim per coitum. . . . Tamen contigit saepenumero ex simplici unctione cum modico argenti uiui roborata predictos dolores, pustulas, ulcerationes, & squallidam scabiem intra hebdomadam, brachia à cubito, & tibias à genu infra liniendo, haud dubie me curasse. . . . Linimenti receptum prius ordinabo nobilissimae operationis, quod & ualet in quocunque tempore huiusmodi morbi, cuius talis est nostra descriptio. Recipe pinguedinis porcinae liquefactae lib. j. olei camomelini anethini ana unc. j. olei masticini, laurini ana unc. j. storacis liquidae drac. x. radicum enulae aliquantulum conquassatae, radicum ebuli ana unc. iiii. squināti, stoecados ana parum, euforbii pisti unc. s. uini odoriferi lib. j. s. bulliant omnia simul usque ad consumptionem uini, deinde colentur, cui colaturae addantur litargirii aurei un. viii. thuris, masticis an. ʒvi. resinae pini un. j. s. tereb. clarae un. j. argenti uiui extincti cum saliua. unc. iiii. cerae albae unc. j. & s. liquefactis oleis cum cera omnia adinuicem incorporentur, & fiat linimentum.

John of Vigo

Book V. of Practical Surgery.—In the year 1494, the month of December, of the year in which the most serene Charles King of the Franks betook himself towards Italy with a great accompanying host to recover the kingdom of Naples, there appeared a certain kind of disease of unknown nature, as it were throughout Italy: different peoples have called this by various and diverse names. The French certainly called it the "Neapolitan disease," because they say that the disease itself passed over at the same time as they returned from Naples into France. But the Neapolitans name it the "French disease," because in the said year this disease was spread and became evident throughout Italy. . . . Besides, the disease mentioned was, and still is, contagious especially by coitus. . . . Yet it frequently happens that I have undoubtedly cured by means of a simple ointment, strengthened with a little quicksilver, the said pains, pustules, ulcerations, and filthy eruption within a week, by smearing the arms from the elbow, and the legs from the knee downward. . . . I shall first set out the recipe for a liniment of most renowned action which is also effective at any period of this disease; this is our description of it. ℞ Liquefied lard lib. j; oils of chamomile and dill each ℥j; oils of mastich and laurel each ℥j; liquid storax ʒx; roots of enula somewhat bruised, and of dwarf-elder each ℥iv; small woodruff and French lavender each a little; euphorbia ℥ss; scented wine lib. jss. Boil all together till the wine disappears, then strain, add golden litharge ℥viii; frankincense, mastich each ʒvj; pine resin ℥jss; clear turpentine ℥j; quicksilver extinguished with saliva ℥iv; white wax ℥jss. To the oils liquefied with the wax mix in everything in turn and let it be a liniment.

JOHN KAYE *or* CAIUS (1510–1573) *studied at Cambridge and Padua; he was physician to Edward VI., Mary, and Elizabeth; was the first Master of Gonville and Caius College; and wrote on the Sweating Sickness and other subjects.*

THE BOKE OF JHON CAIUS AGAINST THE SWEATYNG SICKNES. . . . The beginnyng of the disease.—In the yere of our Lorde God M.CCCC.LXXXV. shortly after the vij. daye of august, at whiche tyme kynge Henry the seuenth arriued at Milford in walles, out of Fraunce, and in the firste yere of his reigne, ther chaunced a disease among the people, lastyng the reste of that monethe & all september, which for the soubdeine sharpenes and vnwont cruelnes passed the pestilence. . . . Let vs therfore returne to the thing, which as occasiō & cause serued, came againe in the M.D.VI. the xxii. yeare of the said Kyng Henry the seuenth. Aftre that, in the yeare M.D.XVII. the ix. yeare of Kyng Henry the viii., and endured from July vnto ye middest of Decēbre. The iiii. tyme, in the yeare M.D.XXVIII. the xx. yeare of thesaied Kyng, beginning in thende of May, & continuing June and July. The fifth tyme of this fearful *Ephemera* of Englande, and pestilent sweat, is this in the yeare M.D.LI. of our Lorde GOD, and the fifth yeare of our Souereigne Lorde King Edwarde the sixth, beginning at Shrewesbury in the middest of April, proceadinge with greate mortalitie to Ludlowe, Prestene, and other places in Wales, then to Westchestre, Couentre, Drenfoorde, and other tounes in the Southe, and suche as were in and aboute the way to London, whether it came notablie the seuenth of July. . . .

This disease is not a Sweat onely (as it is thought & called) but a feuer, as I saied, in the spirites by putrefaction venemous, with a fight, trauaile, and laboure of nature againste the infection receyued in the spirites, whervpon by chaunce foloweth a Sweate, or issueth an humour compelled by nature. . . . That it is a feuer, thus I haue partly declared, and more wil streight by the notes of the disease, vnder one shewing also by thesame notes, signes, and short tariance of the same, that it consisteth in the spirites. First by the peine in the back, or shoulder, peine in the extreme partes, as arme, or legge, with a flusshing, or wind, as it semeth to certeine of the pacientes, flieng in the same. Secondly by the grief in the liuer and the nigh stomacke. Thirdely, by the peine in the head, & madnes of the same. Fourthly by the passion of the hart. . . . Wherupon also foloweth a marueilous heauinesse (the fifthe token of this disease), and a desire to sleape, neuer contented, the senses in al partes beynge as they were bounde or closed vp, the partes therfore left heuy, vnliuishe, and dulle. Laste foloweth the shorte abidinge, a certeine Token of the disease to be in the spirites, as wel may be proued by the *Ephemera* that Galene writethe of, whiche because it consistethe in the spirites, lasteth but one natural day.

DESIDERIUS ERASMUS (1466–1536), *while not himself a member of the medical profession, is a Renaissance representative of the old philosophers. He stands as the supreme type of cultivated common sense applied to human affairs, and his appreciation of the medical art* (*written about* 1500) *is therefore most valuable.*

ENCOMIUM ARTIS MEDICAE ERASMO AUTORE

Cuius quidem ea vel praecipue laus est, primum quod nullis omnino praeconiis indiget, ipsa abunde per se vel utilitate, vel necessitate commendata mortalibus. . . .

Etenim si quis secum reputet, quam multiplex in corporibus humanis diversitas, quanta ex aetatibus, sexu, regionibus, coelo, educatione, studiis, usu varietas, quam infinita in tot milibus herbarum (ne quid interim dicam de caeteris remediis) quae alibi aliae nascuntur, discrimina. Tum quot sint morborum genera, quae trecenta nominatim fuisse prodita scribit Plinius, exceptis generum partibus, quarum omnium quam nullus sit numerus, facile perpendet, qui tantum norit, quot formas in se febris vocabulum complectatur, ut ex uno caetera aestimantur; exceptis his, qui quotidie novi accrescunt, neque secus accrescunt, quam si de composito cum arte nostra bellum suscepisse videantur. Exceptis venenorum plus mille periculis, quorum quot species sunt, tot sunt mortis genera, totidem remediorum differentias flagitantia. Exceptis casibus quotidianis lapsuum, ruinarum, ruptionum, adustionum, luxationum, vulnerum, atque his consimilium, quae prope cum ipso morborum agmine ex aequo certant. Denique qui cogitet, quanta sit in corporum coelestium observatione difficultas, quae nisi cognoris, saepenumero venenum erit, quod in remedium datur, Ne quid interim commemorem saepe fallaces morborum notas, sive coloris habitum spectes, sive lotii signa rimeris, sive pulsus harmoniam observes, velut hoc agentibus malis, ut hostem medicum fallant et imponant.

Jam auget et illud non levi argumento medicinae gloriam, quod et Caesarearum legum majestas, et pontificiarum autoritas sese ultro medicorum judicio submittit. . . . Divus item Augustinus ex medicorum consilio fieri iubet, quod faciendum est, etiamsi nolit aegrotus. Idem honorem medico debitum, hoc est artis et industriae praemium, recte eripi scribit ab eo qui detinet, velut ab injusto possessore et quod alienum est mala fide occupante. Quin ii quoque, qui conceptis precaminibus, daemones impios e corporibus humanis exigunt, non raro in consilium adhibent, velut in his morbis, qui secretis rationibus quaedam sensuum organa spiritusque vitiant, et adeo daemoniacam speciem imitantur, ut nisi a peritissimis medicis discerni non queant, sive sunt crassiores aliqui daemones, ut fertur illorum varia natura, qui medicam etiam opem sentiant, sive morbus adeo penitus intimis animi recessibus insidet, ut a corpore videatur alienus. . . .

Vobis igitur magnopere gratulor, eximii viri, quibus contingit in hoc pulcherrimo genere professionis excellere.

Vos adhortor, optimi juvenes, hanc toto pectore complectimini, in hanc nervis omnibus incumbite, quae vobis decus, gloriam, autoritatem, opes est conciliatura, per quam vos vicissim amicis, patriae, atque adeo mortalium generi non mediocrem utilitatem estis allaturi.

The highest praise of medicine is that she does not need any praise, as she commends herself amply to man by her usefulness, nay by her necessity. . . .

For, if we consider how great a diversity there is in human bodies, arising from difference of age, sex, country, climate, education, profession and habits; and how infinitely various are the many thousands of herbs (not to speak of other remedies) which grow each in a different place: then how many kinds of diseases there are, the number of which, according to Pliny, who mentions them by name, is three hundred, not taking into account the subdivisions of these kinds, which anybody easily understands to be innumerable who but knows how many varieties are contained in the word fever; not considering the new diseases that daily arise and grow, as if they were agreed to enter upon war with our science; not taking into consideration the more than a thousand poisons, each of which causes a different sort of death and so requires a special remedy; without taking into account such cases of daily occurrence as stumbling, falling, fracture, burning, spraining, wounding and the like, the number of which almost equals that of the diseases; then if we further consider how difficult it is to observe the heavenly bodies, which the doctor is bound to know lest the remedy he administers should really be poison; not to speak of the deceptive symptoms of diseases, whether the colour is considered or the signs of the urine are examined or the pulse-beats are observed, as it seems that the diseases are bent on deceiving and imposing upon their enemy, the doctor.

The glory of the art of medicine is enhanced in no small degree by the fact that the sublime imperial and pontifical laws voluntarily submit to the judgment of the physicians. . . . The divine Augustinus also prescribes that a sick person shall, even against his will, be treated according to the doctor's advice, and he justly says that the honour due to the physician, that is the reward for his art and exertion, ought to be compulsorily taken from him who refuses to give it, as from a man who knowingly keeps in his possession the property of another. Even those who expel evil spirits from the human body by means of incantations often consult a physician, for instance about those diseases that disturb the organs of body or mind in a secret manner, which so much appear to result from diabolical influence, that only very able physicians can discern, whether the devils are of the grosser kind (it is well known that there are various kinds of devils), that are liable to medical treatment also, or whether the disease has penetrated into the deepest recesses of the soul, so that it has no connexion with the body. . . .

Therefore, I congratulate you with all my heart, distinguished men, who have the privilege to excel in this beautiful profession.

And you, good youths, I exhort you to apply yourselves to it with all your strength; to throw all your energies into the study of a science that will procure you honour, glory, dignity, wealth, and by which you, in your turn, will be a more than ordinary blessing to your friends, to your country, nay, to the whole human race.

MONDINO DI LIUCCI (1275–1326), *a Professor of Anatomy in Bologna, reintroduced the study of human anatomy as against the dissection of pigs, and wrote the first original text-book on practical anatomy in the Middle Ages. His little book remained popular for two centuries, and an early printed edition* (1513) *contains* 79 *pp.*

INCIPIT ANATHOMIA MUNDINI. — Quia ut dixit Galienus. septimo terapētice Methodi auctoritate Platonis. opus in aliqua scientia vel arte traditur tribs. de causis. Primo vt quis satisfaciat amicis. Secūdo vt exercitetur quis exercitio vtilissimo qd est per intellectū. Tertio vt illo remedietur obliuione : que est ex senectute. Hinc est q. his tribus de causis pmotus proposui meis scholaribus in medicina quoddā opus cōponere.

DE ANATHOMIA MATRICIS.— . . . Et ppter istas quattuor cās mulier quā anathomizaui anno pterito. s. anno xpi. MCCCXV. in mēse Jauarii maiorē in duplo habuit matricē q̄m illa quā anathomizaui āno eodē de mēse Martii. . . . Et ppterea cēties erat maior matrix Porche quā anathomizaui anno dn̄i MCCCVI. q̄m unq̄m videri pt. in femina humana : Potuit tn̄ eē alia cā q. erat pregnās et habebat in utero xiii porcellos et in ea mos̄traui anathomiā fetus sive pregnātis quā tibi narrabo.

LEONARDO DA VINCI (1452–1519) *was specially noted for his painstaking work in practical anatomy and his many admirable drawings of dissections. Undoubtedly the early* 16*th-century medical schools of N. Italy received much stimulus from him. Many of his anatomical sketches, and especially those dealing with the heart and blood-vessels, upon which he busied himself much, are found in the Windsor Castle Collection.*

MONDINO DI LIUCCI

THE BEGINNING OF MUNDINO'S ANATOMY.—Because as Galen says in the seventh book of his Method of Healing, on the authority of Plato, a work in any science or art is propounded for three reasons. Firstly to satisfy one's friends; secondly that one may obtain a most useful exercise, that is by the mind; thirdly that so one may be saved from forgetfulness, which comes with age. Hence it is that, moved by these three causes, I have proposed to put together a certain work in medicine for my scholars.

ON THE ANATOMY OF THE UTERUS.—. . . And for these four causes the woman whom I anatomized in the past year, or A.C. 1315, in the month of January had a uterus twice as large as one whom I anatomized in the month of March in the same year. . . . And because the uterus of a pig which I anatomized in A.D. 1306 was a hundred times larger than it can ever be seen in a human being, there may be another cause, i.e. because it was pregnant and had in the uterus 13 little pigs. In this I showed the anatomy of the foetus or of pregnancy as I shall tell you.

FROM WINDSOR MSS. OF NOTEBOOKS. ÉTUD. ANAT. REC. B. 7 V.—And you who say that it is better to look at an anatomical demonstration than to see these drawings, you would be right, if it were possible to observe all the details shown in these drawings in a single figure, in which, with all your ability, you will not see nor acquire a knowledge of more than some few veins, while, in order to obtain an exact and complete knowledge of these, I have dissected more than 10 human bodies, destroying all the various members, and removing even the very smallest particles of the flesh which surrounded these veins.

ANDREAS VESALIUS (1514–1564), *Professor of Anatomy at Padua, Pisa, Bologna, and Basel, was the most noteworthy of a group of distinguished contemporary anatomists (e.g. Sylvius, Vidius, Eustachius, Falloppius, Varolius) by his publication of a splendidly illustrated book of systematic human anatomy. He was later physician to the Emperor Charles V., and died on a pilgrimage to Jerusalem.*

DE HUMANI CORPORIS FABRICA (Liber VI. Cap. xiii.)

DE UNDECIM MEMBRANULIS QUATUOR ORIFICIORUM CORDIS.—Ea corpora cordis membranas nuncupamus, quae cordis uasorum radicibus, ipsorum ue exortibus adnata, calore, substantia, crassitie prorsus membranae existunt, materierum regurgitationibus praefectae. Sunt porro hae omnes ex praecipuorum Anatomicorum sententia undecim numero, ac tres quidem singulis trium uasorũ orificiis, duae autem duntaxat uno quarto ue adnascuntur. Vena caua, quam primum dextri uentriculi uas esse recensuimus, suas membranas, uti modo subiungam, locatas exigit. . . . Secundum uniuersam eorundem humiliorem sedem (quae etiam ut cauae orificii membranularum, crassior duriorq; existit) fibrae seriatim ex illis enascuntur, quae deorsum porrectae, tandem cordis substantiae ad mucronis sinistri uentriculi amplitudinem passim adnascuntur: & quemadmodum in dextro uentriculo fieri diximus, carnea cordis substantia adaugentur stabiliunturq; Caeterum quia membraneus uenalis arteriae circulus in duos tantum processus dirimitur, dissectionis proceres duas tantum membranulas ipsius orificio praefici asserunt: quas mitrae episcopali non admodum inepte contuleris, si modo partem caput amplectentem ipsi membraneo circulo, & huius processus anteriori posterioriq; mitrae cacumini assimilaueris.

ANDREAS VESALIUS

ON THE STRUCTURE OF THE HUMAN BODY (Bk. VI. Chap. xiii.)

ON THE ELEVEN LITTLE MEMBRANES OF THE FOUR HEART-OPENINGS.—Those bodies we call membranes of the heart which spring from the roots of the vessels themselves or from their places of origin, and have in heat, substance, and density exactly the constitution of membranes set against the regurgitation of materials. These are, moreover, in the opinion of the best anatomists eleven in number, and three spring from each of the openings of three vessels, while there are only two at the fourth. The vena cava which we have reviewed as being the chief vessel of the right ventricle requires its membranes placed as I shall immediately mention. . . . All along the lower region of the same (which is also rather thick and hard, like that of the little membranes at the opening of the vena cava) fibres arise one by one from them and stretch downward till they are joined here and there all over the edge of the left ventricle; and, as we have said happens in the right ventricle, they are increased and strengthened by the fleshy substance of the heart. But since the membranous circle of the pulmonary vein (left auricle) is divided only into two processes, the leading dissectors claim that two little membranes only are set to command the opening of the same: these you may compare not very inaptly to a bishop's mitre, if only you will liken the part embracing the head to the membranous circle itself, and the processes of this to the front and back peaks of the mitre.

Das Buch von natürlichen Dingē

Von Schweffel.—Roh ſoll er in die Artzney nicht gebraucht werden allein ſepariert von *fecibus*, Als dann ſo iſt er ein treffenliche artzney nemlich ſo er vom *aloepatico* unnd von *mirra* Eliviert wirt Zum andern mal oder zum drittē mal ſo iſt er ein ſolch Preſervatiff in der Peſtilētz in *pleuresi*, in allē geſchwert und feulung des leibs alſo ſo er eingenom̄en wirt zu morgen ds er deſſelbigē tags kein newe krāckheit leſt einfallen d' peſtilenz *pleuresi*, od' dergleichē and'n geſchwern ſond'lich mit dē recept gordnet.

> *Recipe Sulphuris purgati, uncias X. Mirrae Romanae, unciam unam semis. Aloepatici, unciā unam. Croci orientalis, unciam semis. Misce fiat pulvis.*

Widerum auch ſo wiſſend. So er von vitriol eleviert wirt etlich mal je offter je beſſer ſo entpfacht er die *essentiā* vn̄ die *Spiritus vitrioli* zu jm alsdan̄ ſo iſt er ein preſervatiff in allē fiebern un̄ ein Curatiff in allen huſtē Alten un̄ newē mehr dan̄ zuſchreiben iſt oder zu offnē in eim buch er iſt auch ein preſervatiff in d' fallendē ſucht auch ein Curatiff in d' jugēt . . . darūb ich jn bullich lob und in ſonderheyt hie fürhalt ūn ſo es gebürlich wer dē groben büffel doctoren d' Hohenſchuln fürzulegē dē grūdt es mocht mit etlichen bogen Papir nit beſchrieben werden. Aber das Perlin gehort für dieſelbigen ſew nit jnen iſt lieber die leut werdē kranck lam contract als ds ſie geſundt bleiben un̄ wiſſen un̄ konnen in doch nit helffen. Darumb ſo mercken auff dē mineraliſchen *sulphur*. . . .

Aber ds will ich mit euch allen bezeugen Edel un̄ unedel das alle Doctor nur neben abgehen was der verführer *Galenus, Avicenna, &c.* ſagen. Das muß alſo ſein unnd ſterben auff ſolche lügen. Alſo hat ſie der Teuffel beſeſſen domit das ſie die liebe im nechſtē nicht volbringen und alſo jhr kinder der ewigen verdamnuß werden das iſt ihr ſtudiern das iſt ihr werck auff erden ds ſie thundt. Von aller erſten ſollen wir ſuchen das Reich, Aber nit beim Priſter noch beim Leviten Sonder beim Samaritaner ſo wir die barmhertzigkeyt in uns haben.

Von dem öl des Roten Vitriols.—So wiſſen nun weiter wie das vom *Colcotar* durch retortiſch diſtillatiō wie dann den Alchimiſten bekandt iſt vom Vitriol ein öl wirt und geht blutrot un̄ am ſauriſten das iſt nun das öl das die laboranten geſucht haben beſſer zuſein dann der *Spiritus* in den kranckheyten vō den dann gemelt iſt Als dan̄ nicht iſt.

PARACELSUS

THEOPHRASTUS BOMBASTUS VON HOHENHEIM, PARACELSUS (1493–1541), *studied at Basel University, in the mines of Tyrol, and on extensive wanderings. He has the credit of forming a link between the alchemists and medicine whereby new substances came into use, and of revolting from scholastic tradition. His writings are characterized by furious aggressiveness in many instances and by fondness for mysticism in others.*

THE BOOK OF NATURAL THINGS

OF SULPHUR.—It is not to be used raw in physic, but separated from dregs; then it is an excellent physic, especially when it is combined with aloe, hepaticum and myrrh. For the second or third time it is a great preservative in pestilence, in pleurisy, and in all foulness and festers of the body. If it is taken in the morning, on that day it prevents the onset of any new disease, whether pestilence, pleurisy, or any similar disease or foulness. It is particularly ordered in this prescription. (*Prescription*)

Again this is to be known. If it is treated with vitriol several times (the oftener the better), it obtains the essence of the spirit of vitriol. Then it is a preservative from all fevers and a curative in all coughs chronic and acute more than can be described, or published in a book. It is also a preservative in the falling sickness, and a curative during youth. . . . Therefore I praise it justly and consider it here to be a special thing; and if it were fitting to lay the reasons before the coarse cattle of University doctors, this could not be done in many sheets of paper. But this pearl is not for such swine. They would rather have the people sick, lame, and crippled than remaining healthy, and they neither know nor can do anything to help them. Therefore mark well the mineral sulphur. . . .

But this will I demonstrate to you all, noble and ignoble alike, that all doctors only pursue side by side the way which the corruptor Galen, Avicenna, &c., point out. This must be however, and they die in such lies. Therefore the devil has possessed you that you love not your neighbours, and so you become children of everlasting damnation, which is your study and the work you do on earth. Before all things we should seek the Kingdom, but not with Priest nor Levite, but with the Samaritan so that we may have compassion within us.

OF THE OIL OF RED VITRIOL.—Know then how, just as the alchemists were able by distillation in retorts to produce it from *Colcotar*, so from vitriol an oil is produced of blood-red colour and very acid. This is the oil which the workers have thought to be better than spirit in the sicknesses mentioned, but this is not so. [Now it is not necessary to bring to common knowledge the process of preparation, for it depends upon the exercise of good care and upon good instruments. It is acid beyond all other things, nothing more so, and likewise it has a corrosive property. . . . In fine it demands great respect. It is indeed true beyond what I have mentioned that so much soundness is in its composition that it is to be given in all fevers and loss of appetite.]

AMBROISE PARÉ (1510–1590), *the "father of modern surgery," spent most of his earlier life with the French armies in the field. While he quotes constantly from ancient writers, he tests everything by his own experience. His chief contributions to surgery were the soothing treatment for gunshot wounds and the reintroduction of the ligature for common use in stopping haemorrhage.*

DISCOURS PREMIER SUR LE FAIT DES HARQUEBUSADES ET AUTRES BASTONS A FEU.—L'an mil cinq cent trente-six, le grand Roy François envoya une grande armée en Piedmont, pour enuitailler Thurin, et reprendre les villes et chasteaux. . . . I'estois en ce temps-là bien doux de sel, parce que ie n'auois encores veu traiter les playes faites par harquebuses : il est vray que i'auois leu en Iean de Vigo, livre premier des *Playes en general*, chapitre 8, que les playes faites par bastons à feu participent de venenosité, à cause de la poudre : et pour leur curation commande les cauteriser auec huile de sambuc, en laquelle soit meslé vn peu de theriaque. Et pour ne failler, parauant qu'user de ladite huile fervente, sçachant que telle chose pourroit apporter au malade extreme douleur, ie voulus sçauoir, premierement que d'en appliquer, comme les autres Chirurgiens faisoient pour le premier appareil, qui estoit d'appliquer ladite huile la plus boüillante qu'il leur estoit possible dedans les playes, auec tentes et setons : dont ie prins hardiesse de faire comme eux. En fin mon huile me manqua, et fus contraint d'appliquer en son lieu vn digestif fait de iaune d'œuf, huile rosat et terebinthine. La nuit ie ne peu bien dormir à mon aise, pensant que par faute d'avoir cauterisé, ie trouuasse les blesses où i'auois failli à mettre de ladite huile morts empoisonnés : qui me fit leuer de grand matin pour les visiter. Où outre mon esperance, trouuay ceux auxquels i'auois mis le medicament digestif, sentir peu de douleur à leurs playes, sans inflammation et tumeur, ayans assez bien reposé la nuit : les autres où l'on auoit appliqué ladite huile, les trouvay febricitans, auec grande douleur, tumeur et inflammation aux enuirons de leurs playes. Adonc ie me deliberay de ne iamais plus brusler ainsi cruellement les pauures blessés de harquebusades.

Chap. xxii. CONTUSIONS, COMBUSTIONS, ET GANGRENES.—Lors que l'amputation du membre est faite, il est necessaire que quelque quantité de sang s'escoule, à fin qu'à la partie deschargée y suruiennent moins d'accidens, et selon la plenitude et force du malade. Le sang escoulé en quantité suffisante (prenant tousiours indication des forces du malade) il faut promptement lier les grosses veines et arteres si ferme qu'elles ne fluent plus. Ce qui se fera en prenant lesdits vaisseaux auec tels instrumens, nommés Becs de

AMBROISE PARÉ

FIRST TREATISE UPON THE ACTION OF ARQUEBUSES AND OTHER FIRE-ARMS.—In the year 1536 the great King Francis sent a great army into Piedmont, to harass Turin and retake the towns and castles. . . . I was then quite unsophisticated because I had not yet seen wounds made by arquebuses treated: it is true that I had read in John of Vigo's First Book of *Wounds in General*, chapter 8, that the wounds made by fire-arms take on poisoning because of the powder, and for their cure he orders them to be cauterized with sambuc oil in which is mixed a little theriac. And not to err, before using the said boiling oil, knowing that such a thing could inflict extreme pain on the patient, I wished to know, previously to applying it, how the other surgeons did at the first dressing, which was to apply the said oil as nearly boiling as they could within the wounds by tents and setons; then I had the hardihood to do like them. Finally my oil failed, and I was constrained to apply in its place a digestive made from yolk of egg, oil of roses and turpentine. At night I could not sleep quite easy for thinking that through want of cauterization I should find the injured, to whom I had failed to apply the said oil, poisoned to death. This made me rise very early to visit them. Beyond my hope I found that those, on whom I had placed the digestive dressing, felt little pain in their wounds, were devoid of inflammation and swelling, and had passed quite a good night; the others, to whom one had applied the said oil, I found fevered, with great pain, swelling and inflammation around their wounds. Then I resolved never more to burn so cruelly the poor people wounded by arquebuses.

Chap. xxii. CONTUSIONS, BURNS, AND GANGRENES.—When the amputation of the member is done, it is necessary that some amount of blood should run off, to the end that fewer accidents may happen to the part operated upon, and this must be according to the fulness and strength of the patient. The blood having run off in sufficient quantity (taking the indication always from the powers of the patient) it is proper at once to tie the large veins and arteries so firmly that they cease to flow. This will be effected by grasping the said vessels with the instruments called "crow-beaks." . . . With these instruments

Corbin. . . . De ces instrumens faut pinser lesdits vaisseaux (qui n'est mal-aisé à faire, parce qu'on voit le sang iaillir par iceux), les tirant et amenant hors de la chair, dans laquelle se sont retirés et cachés soudain apres l'extirpation du membre, ainsi que font toutes autres parties coupées, tousiours vers leur origine. Ce faisant, il ne te faut estre trop curieux de ne pinser seulement que lesdits vaisseaux: pource qu'il n'y a danger de prendre avec eux quelque portion de la chair des muscles, ou autres parties : car de ce ne peut aduenir aucun accident : ains auec ce l'vnion des vaisseaux se fera mieux et plus seurement, que s'il n'y auoit seulement que le corps desdits vaisseaux compris en la ligature. Ainsi tirés, on les doit bien lier auec bon fil qui soit en double.

LES VOYAGES FAITS EN DIVERS LIEUX.—Vn sergent du Chastelet, demeurant prés sainct André des Arts, qui eut vn coup d'espée à la gorge au pré aux Clercs, qui coupoit tout en trauers la veine iugulaire externe, subit qu'il fut blessé, posa son mouchoir sur la playe, et me vint trouuer en ma maison : et lors qu'il osta son mouchoir, le sang iaillissoit d'vne grande impetuosité. Subit liay la veine vers sa racine: par ce moyen fust estanché, et guarist graces à Dieu. Et si on eust suiui vostre maniere d'estancher le sang par les cauteres, ie laisse à penser s'il fust guari : ie crois qu'il fust mort entre les mains de l'operateur.

CANONS ET REIGLES CHIRURGIQUES

Vn remede experimenté
Vaut mieux qu'vn nouueau inuenté.

Où il y a contusion,
Procure suppuration.

Au mal de pied, ou iambe, ou cuisse,
Le lit est salubre et propice.

La gangrene qui est ja grande,
Rien que le cousteau ne demande.

Ceux qui sont par labeur bien souuent agités,
Sont exempts de plusieurs sortes d'infirmités.

Il faut tousiours donner au malade esperance
Encore que de mort y ait grande apparence.

one must pick up the said vessels (which is easy to do because one sees the blood spurt from them), pulling them and bringing them out of the flesh, in which they are suddenly retracted and hidden after the removal of the member, just as all other cut parts do, always towards their origin. In doing this you need not be too careful to pick up only the said vessels: because there is no danger in grasping with them some part of the flesh of the muscles, or other parts: for from this no accident can result. Also with this the union of the vessels will be effected better and more securely, than if only the bodies of the said vessels were included in the ligature. Thus drawn out one should tie them well with good thread which should be double.

THE JOURNEYS MADE IN VARIOUS PLACES.—A sergeant from the Châtelet, living near St. André-des-Arts, who got, at the Students' Meadow, a sword-cut on the throat that severed the external jugular vein, immediately he was injured put his kerchief on the wound and came to find me at my house: and when he took away his kerchief the blood spouted out with great force. Quickly I tied the vein towards its root, and by this means it was stanched and healed, thanks be to God. And if one had followed your method of stanching blood by cauteries, I leave you to think if it would have healed; I believe he would have died in the hands of the operator.

SURGICAL CANONS AND RULES

A remedy tried is worth more than one new found.

Where there is bruising procure suppuration.

For illness of the foot or leg or thigh, bed is healthy and propitious.

Gangrene that is great needs nothing but the knife.

Those who are often hard at work escape many kinds of trouble.

It is right to give the patient always hope, even when there is great likelihood of death.

MICHAEL SERVETUS *of Villanueva* (1511–1553), *theologian, scholar, and physician, edited Ptolemy's Geography, Pagnini's Bible, etc. He gave the earliest account of the pulmonary circulation in his "De Erroribus Trinitatis," and for the theological novelties in this work he was, on the instigation of Calvin, burned at the stake along with almost all the copies of his book. A copy preserved in Edinburgh University Library is said to have belonged to Calvin.*

DE TRINITATIS ERRORIBUS (p. 170)

Ad quam rem est prius intelligenda substantialis generatio ipsius vitalis spiritus, qui ex aere inspirato & subtilissimo sanguine cōponitur & nutritur. Vitalis spiritus i sinistro cordis vētriculo suā originē habet, invātibus maxime pulmonibus ad ipsius generationem. Est spiritus tenuis, caloris vi elaboratus, flavo colore, ignea potentia, ut sit quasi ex puriori sanguine lucidus vapor, substantiam in se continens aquae acris & ignis. Generatur ex facta in pulmonibus mixtione inspirati acris cū elaborato subtili sanguine, quē dexter vētriculus cordis sinistro communicat. Fit autem cōmunicatio haec, non per parietem cordis, mediū, ut vulgo creditur. Sed magno artificio a dextro cordis ventriculo, longo per pulmones ductu, agitatur sanguis subtilis a pulmonibus praeparatur, flavus efficitur: & a vena arteriosa in arteriam venosam transfunditur. Deinde in ipsa arteria venosa inspirato aeri miscetur, & expiratione a fuligine repurgatur. Atque ita tandem a sinistro cordis ventriculo totum mixtum per diastolem attrahitur, apta suppelex, ut fiat spiritus vitalis.

Quod ita per pulmones fiat cōicatio & praeparatio, docet cōiunctio varia & cōicatio venae arteriosae cū arteria venosa ī pulmonibus. Cōfirmat hoc magnitudo insignis venae arteriosae, quae nec talis, nec tāta facta esset, nec tātā a corde ipso vim purissimi sanguinis in pulmones emitteret, ob solū eorū nutrimentum, nec cor pulmonibus hac ratione serviret: cū praesrtim antea in embryone solerent pulmones ipsi aliunde nutriri, ob membranulas illas, seu valvulas cordis, usque ad horā nativitatis nōdū apertas, ut docet Galenus. Ergo ad alium usum effunditur sanguis a corde in pulmones hora ipsa nativitatis, & tā copiosus. Itē, a pulmonibus ad cor non simplex aer, sed mixtus sanguine mittitur, per arteriam venosam: ergo in pulmonibus fit mixtio. Flavus ille color a pulmonibus datur sanguini spirituoso, non a corde. In sinistro cordis ventriculo non est locus capax tantae & tam copiosae mixtionis, nec ad flavum elaboratio illa sufficiēs. Demum paries ille medius, cum sit vasorum & facultatum expers, non est aptus ad communicationē & elaborationē illam, licet aliquid resudare possit. Eodem artificio, quo in hepate fit transfusio a vena porta ad venam cavam propter sanguinem, fit etiam in pulmone transfusio a vena arteriosa ad arteriam venosam propter spiritum. Si quis haec conferat cum iis quae scribit Galenus lib. 6 & 7 de usu partium, veritatem penitus intelliget, ab ipso Galeno non animadversam.

MICHAEL SERVETUS

ON ERRORS AS TO THE TRINITY

For this purpose we must first understand the substantial generation of the vital spirit itself, which is compounded of, and nourished by, air breathed in and the most subtle blood. The vital spirit has its origin in the left ventricle of the heart, the lungs chiefly assisting in its generation. It is a fine spirit, prepared by the power of heat, of reddish colour, and fiery power, as it were a clear vapour from the purer blood, having in it the essence of water, air, and fire. It is produced from a mixture made in the lungs of breathed air with the subtle part of the blood, which the right ventricle of the heart communicates to the left. Now this communication does not take place through the septum of the heart, as is commonly supposed, but by wonderful mechanism this subtle blood is driven from the right ventricle, by a long course through the lungs ; it is worked on by the lungs and made ruddy and is poured from the pulmonary artery into the pulmonary vein. Then it is mixed in this pulmonary vein with breathed air and freed from sooty matter by expiration. So at length the whole mixture is drawn in by the left ventricle through diastole, and the preparation is complete for the spirit to become vital.

That the communication and preparation take place thus through the lungs is shown by the varied joining and communication of the pulmonary artery with the vein in the lungs. The great size of the pulmonary artery confirms this, for it would not be so large, and would not send such a stream of the purest blood from the heart into the lungs, merely for their nourishment, nor would the heart be a slave to the lungs for this reason, chiefly because the lungs in the embryo are otherwise nourished, since those membranes or valves of the heart are not open up to the hour of birth, as Galenus says. So the blood is poured from heart to lungs at the very hour of birth in such quantities for another purpose. Likewise it is not air simply but air mixed with blood that is sent from lungs to heart through the vein-like artery. Therefore the mixture takes place in the lungs, the ruddy colour is given to the vital blood by the lungs not by the heart. In the left ventricle of the heart there is no room for such an abundant mixture, nor would preparation there be sufficient for the ruddiness. Lastly, the septum, void of vessels and properties, is not suited for the communication and preparation, though there may be some soaking through it. By a mechanism like that by which transfusion from the "vena portae" to the "vena cava" takes places in the liver for the sake of blood, transfusion takes place in the lung also from the pulmonary artery to the vein, for the sake of the spirit. If any one compares this with what Galen writes in books 6 and 7 "De usu partium," he will clearly see the truth, of which even Galen was ignorant.

William Harvey (1578–1657) *studied at Cambridge and Padua, practised in London and at Oxford, was physician to James I. and Charles I. He published several important scientific works; of these the most celebrated is the "Exercitatio Anatomica," in which he gave the first complete demonstration of the circulation of the blood. It is a small book of* 72 *pp. published in* 1628.

Exercitatio Anatomica, De motu Cordis et Sanguinis in Animalibus

Cap. I.—Cum multis viuorum dissectionibus (uti ad manum dabantur) animum ad obseruandum primū appuli; quo cordis motus vsum, & vtilitates in animalibus per autopsiam, & non per libros aliorumque scripta inuenirem: Rem arduam plane, & difficultatibus plenam cōtinuo reperi, vt (cum Fracastorio) motum cordis soli Deo cognitum fuisse, penè opinarer. . . .

Cap. IX. . . . Supponamus (vel cogitatione vel experimento) quantum sanguinis, sinister ventriculus in dilatatione (quum repletus sit) contineat siue ℥ij, siue ℥iij, siue ℥js ego in mortuo reperi vltra, ℥ij. Supponamus similiter, quanto minus in ipsa contractione, vel quātum sese contrahat cor, & quanto minorem ventriculus capacitatem habeat in ipsa contractione, vel ipsis contractionibus, quantum sanguinis in arteriam magnam protrudat: (protrudere enim aliquid semper & ante demonstratum est Cap. 3. & omnes in Systole fatentur, ex fabrica valuularum persuasi) & verisimili coniectura ponere liceat, in arteriam immitti partem vel quartam vel quintam vel sextam, & minimum octauam.

Ita in homine, protrudi singulis cordis pulsibus supponamus vnciā semis, vel drachmas tres vel drachmam vnam sanguinis, quae propter impedimentum valuularum in cor remeare non potest.

Cor vna semihora plusquam mille pulsus facit imo in aliquibus, & aliquando bis, ter, vel quater mille. Iam multiplicatis drachmis, videbis una semihora aut millies drachmas tres, vel drachmas duas, vel uncias quinquies centum, aut talem aliquam proportionatam quantitatem sanguinis, per cor in arterias transfusam, maiori semper copia vniuerso corpore contingat reperiri. . . .

Cap. XIV.—Iam denique nostram de circuitu sanguinis sententiam ferre, & omnibus proponere liceat.

Cum haec confirmata sint omnia, & rationibus & ocularibus experimentis, quod sanguis per pulmones & cor, pulsu ventriculorum pertranseat, & in vniuersum corpus impellatur, & immittatur, & ibi in venas & porositates carnis obrepat, & per ipsas venas vndique de circūferentia ad centrum ab exiguis venis in maiores remeet, & illinc in venam cauam, ad auriculam cordis tandem veniat, & tanta copia, tanto fluxu, refluxu, hinc per arterias illuc, & illinc per venas huc retro, vt ab assumptis suppeditari non possit, atque multo quidem maiori (quā sufficiens erat nutritioni) prouentu. Necessarium est concludere circulari quodam motu in circuitu agitari in animalibus sanguinem; & esse in perpetuo motu, & hanc esse actionem siue functionem cordis, quam pulsu peragit, & omnino motus & pulsus cordis causam vnam esse.

WILLIAM HARVEY

ANATOMICAL EXERCISE ON THE MOTION OF THE HEART AND BLOOD IN ANIMALS

Cap. I.—When first I applied my mind (as opportunity offered) by vivisections in order to find out for myself, instead of by the books and writings of others, the object and uses of the heart-movements in animals, I found the matter so apparently hard and constantly beset with difficulties that I almost believed (with Fracastorius) the motion of the heart could be understood by God alone.

Cap. IX. . . . Let us assume (either arbitrarily or experimentally) how much blood the left ventricle holds in dilatation (when it is full), whether 3, 2, or 1½ ounces—in a corpse I have found over 2 ounces. Let us assume further how much less in size the heart is, or how much it shrinks when it contracts, and how much less capacity the left ventricle then has, and how much blood it projects into the aorta (for that it projects something every time both was demonstrated already in Chap. 3, and is admitted by everybody, convinced thereof by the structure of the valves); and we may suppose, as quite near the truth, that one fourth or one fifth or at least one eighth is driven into the artery. Thus in man we may suppose there is projected at every beat of the heart half an ounce, or three drachms, or one drachm of blood, which because of the resistance offered by the valves cannot return into the heart. The heart in half an hour makes at least 1000 beats, and sometimes 2000, 3000, or 4000. Now, multiplying the number of drachms, you will see that in half an hour there are either 3000 drachms or 2000 drachms or 500 ounces; or that some such proportionate quantity of blood is poured through the heart into the arteries; a greater quantity in every case than may be found in the whole body! . . . .

Cap. XIV.—Now I may offer my opinion on the circulation of the blood and suggest its general adoption.

Since all these things have been proved, both by reason and ocular demonstration—that the blood passes through lungs and heart by the beating of the ventricles, and is driven and distributed all over the body, where it finds a hidden way into the veins and pores of the flesh, and that it returns by the same veins on all sides from the periphery to the centre from the small veins into the larger ones, then into the vena cava, and so arrives at the auricle of the heart, and in such quantity with so great a flow and ebb, hence by the arteries and hither by the veins, that it cannot be furnished from the materials absorbed (and indeed it is a far greater supply than suffices for nutrition); it is a necessary conclusion that the blood in animals is driven with a kind of circular motion; that it is in ceaseless movement; that this is the action or function of the heart performed by its pulsation; and that the movements and pulsations of the heart are its sole and only cause.

MARCELLO MALPIGHI (1628–1694) *was Professor of Anatomy at Pisa, Messina, and Bologna; he was one of the earliest microscopists and may be called the founder of histology. He first described the minute structure of the kidneys, spleen, cerebral cortex, etc.*

DE RENIBUS. Cap. II.— . . . Aliud etiam, quod additur, totam renum hanc portionem absolute fibrosam esse, nihilque praeter hanc, exceptis sanguineis vasis, adesse, multum difficultatis habet: nam in singulis renibus, quos hucusque ad manus habere potui, glandularum minimarum proventum deprehendi, hoc in quadrupedibus, in testudinibus, & in homine ipso semper mihi accidit observare. Ut autem hae facillime innotescant, injiciendus est niger liquor spiritui vini commixtus per arteriam emulgentem, ita ut turgeat totus ren, & exterius denigretur, nam nudis etiam oculis, ablata renum membrana, illico occurrunt bifurcatis hinc inde arteriis appensae nigro & ipsae colore infectae glandulae; & secto per longum eodem rene, inter vasorum urinae fasciculos & enata etiam interstitia innumeras fere easdem observabis, quae sanguineis vasis atro liquore turgidis in speciosae arboris formam productis, veluti poma appenduntur.

ANTONI VAN LEEUWENHOEK (1632–1723), *a clerk at Delft, was the earliest to employ the microscope for medical discovery. He observed the capillary circulation, the fibres of the lens, the striping of muscle, spermatozoa, the cells of the epidermis, some large bacteria, etc. Most of his discoveries were communicated in* 112 *papers to the Royal Society of London.*

DEN WAARAGTIGEN OMLOOP DES BLOEDS, als mede dat de Arterien en Venae gecontinueerde bloedvaten zijn, klaar voor de oogen gestelt. Verhandelt in een Brief, geschreven aan de Koninglijke Societeit tot Londen, van den 7 September 1688.

. . . Soo wy dan nu seer naakt voor onse oogen sien dat het overgaan van het bloet uyt de Arterien in de Venae, in de Kikvorsworm, in geen andere bloet-vaten geschiet, als in soodanige die soo dun sijn, dat maar een enkel deeltje bloet te gelijk kan doorgestoten werden; soo konnen wy nu wel vaststellen, dat het selve in onse lighamen, en in alle Dieren op soodanigen manier werd te weeg gebragt.

. . . Ik hebbe voor desen geseit, dat de delen of globulen van het bloet, die het selvige root maken, soo klein syn, dat thien hondert duysent deelen of globulen, soo groot niet en sijn, als een grof sand is: en over sulks konnen wy ons wel inbeelden, de hoekleinheid van de bloetvaten waar in den ommeloop geschiet. . . .

Als ik een weinig ter sijden van dese Arterien na de buytekant van de staart af sag, ontdekten ik aldaar twee groote Vena, die het bloet weder opwaarts na het Hert voerden; ende daar benevens sag ik dat in dese groote Vena uyt verscheide kleyne Venae het bloet wierd ingestort. In 't kort, ik sag hier myn volkome vergenoeginge ontrent den ommeloop van het bloet, alsoo my in 't minste niets voorquam waar aan ik behoefde te twijfelen.

MARCELLO MALPIGHI

ON THE KIDNEYS. Chap. II.—An additional statement too that the whole of this part of the kidneys is quite fibrous, and that nothing else, save blood-vessels, is present, presents much difficulty: for in every kidney that has so far come into my hands it has always happened that a number of the minutest glands (*Malpighian bodies*) were detected, and this I observed in quadrupeds, tortoises, and in man himself. But in order that these may be most easily recognized, a black fluid mixed with spirit of wine should be injected through the nutrient artery till the whole kidney swells and the outside becomes black, for even to the naked eye when the membrane of the kidney is removed the little glands appear directly hanging here and there from the divided arteries and themselves stained with the black colour; and when the same kidney is cut lengthwise you will see, between the bundles of urinary vessels and the spaces produced, the same little glands in almost countless numbers, which are hung like apples upon the blood-vessels swollen with black liquid and extended into the form of a sort of tree.

ANTONY VAN LEEUWENHOEK

(*Translation of Nederlandsch Tijdschrift voor Geneeskunde*)

THE TRUE CIRCULATION OF THE BLOOD, and also that the Arteries and Veins are continued Blood-Vessels, clearly set forth. Described in a letter written to the Royal Society of London, of the 7th September 1688.

. . . If now we see clearly with our eyes that the passing of the blood from the arteries into the veins, in the frog-worm, only takes place in such blood-vessels as are so thin that only one corpuscle can be driven through at one time, we may conclude that the same thing takes place in the same way in our bodies as well as in that of all animals.

. . . I have said before that the corpuscles or globules that make the blood red are so small that ten hundred thousand of them are not so big as a grain of coarse sand, and so we can easily imagine how very small the blood-vessels are in which the circulation of the blood takes place. . . .

When I looked at the part of the tail beside these arteries on the outside, I discovered there two large veins, which carried the blood back again to the heart, and moreover I saw that blood was driven into this large vein from several small veins. In short, I saw here the circulation of the blood to my perfect satisfaction, because there was nothing, though ever so slight, that caused me any doubt.

HERMANN BOERHAAVE (1668–1738) *studied in and was later Professor of Botany, Medicine, and Chemistry at Leyden. Though he wrote comparatively little he became the most celebrated physician and medical teacher of the* 18*th century, and was sought by great numbers of patients and students from all over Europe. His two chief works were the "Institutes of Medicine" and the "Aphorisms."*

DE USU RATIOCINII MECHANICI IN MEDICINA (MDCCIII)

. . . Depingitur ille, ducendis studii Medici primis lineamentis incumbens, tanquam affixus Geometricae contemplationi figurarum, Corporum, Ponderum, Velocitatis, Fabricae Machinarum, et, quae inde oriuntur in alia corpora, Virium.

His dum mentem exercet, claro discit praecepto et exemplo, liquida ab obscuris, a falsis vera secernere, et ipsa judicandi tarditate animo conciliare prudentiam . . .

Oculum ibi Geometriae luce acutum ad incisa cadavera, ad spirantium corpora brutorum aperta tacitus circumfert. . . .

Aliorum certe durissimo parta labore inventa in suos usus dum accommodat, claram sibi sistit humanae fabricae imaginem. Cui fluidorum vitalium nectit notitiam ; hanc Anatomicis, Chemicis, Hydrostaticis, ipsiusque microscopii adjumentis in vivo corpore, ex extra illud examinat. . . .

Hic incisa, quorum notaverat morbos, ruspatur cadavera ; illic in brutis arte factas aegritudines observat ; nunc eadem ex optimis Auctoribus addiscens ; tandem cuncta digerens, expendensque inter se componit, et his, quae Theoria demonstravit, comparat, unde historiam denique curationemque morborum firmet.

En vobis ultima manu absolutam consummati Medici imaginem !

INSTITUTIONES MEDICAE

986. Respiratio magna & rara denunciat cerebrum obstructum, atque morbos inde factos, futurosve ; ut sunt coma, lethargus, deliria, &c.

999. Urina rubra, absque sedimento, in morbis acutis, docet 1. motum validum attritus inter partes humorem constituentes, inter vasa & humores. 2. intimam & tenacem permistionem olei, salis, terrae, aquae, in humoribus. 3. hinc ergo cruditatem magnam morbi. 4. longam futuram durationem ejus. 5. & magnum in eo periculum.

APHORISMI DE COGNOSCENDIS ET CURANDIS MORBIS

617. Symptomata ex febre acuta singulari orta imprimis haec sunt : frigus, tremor, anxietas, sitis, nausea, ructus, vomitus, debilitas, calor, aestus, siccitas, delirium, coma, pervigilium, convulsio, sudor, diarrhoea, pustulae inflammatoriae.

1196. Si ulcus pulmones excederit ita, ut totus inde habitus Corporis consumatur, Phthisis Pulmonalis aegrum afficere dicitur.

1197. Cujus ulceris origo deducitur ab omni causa, quae valet sanguinem in pulmonibus ita sistere, ut in materiem purulentam abire cogatur.

HERMANN BOERHAAVE: ON THE USE OF THE MECHANICAL METHOD IN MEDICINE (1703)

I imagine a man applying himself to study the first principles of medicine, taken up, as it were, with a geometrical consideration of figures, bodies, weights, speed, construction of machines, and the forces which these produce in other bodies.

While exercising his mind thus, he learns by precept and example how to distinguish clearly the evident from the obscure, the false from the true, and by his very slowness in forming opinions to gain mental balance. . . .

With a vision now cleared by the light of geometry he silently takes in the lessons from dissected bodies and from living animals opened to his gaze. . . .

Indeed whilst adapting to his own use things accomplished and discovered only by the hardest labour of others, he builds for himself a clear idea of the human frame. To this he adds a knowledge of the vital fluids; and tests it in the living person and his excretions by the aids of anatomy, chemistry, hydrostatics, and even of the microscope. . . .

Now he opens and explores the bodies of those whose maladies he has noted; now he studies the diseases he induces upon animals; again he groups together all the results of diseases and of remedies he has tried; again he learns the same things from the best authors; finally, arranging and pondering, he adjusts all things to one another, and, by the means which Theory has shown, he obtains at length a certain grasp of the history and cure in each disease.

See then before you the finished picture of the perfect doctor!

INSTITUTES OF MEDICINE

986. Respiration that is deep and infrequent points to a blockage of the brain and diseases that have thus arisen or will arise, like coma, lethargy, delirium, &c.

999. Urine that is red but devoid of sediment, in acute diseases teaches (1) a strong movement of inflammation between the constituent parts of a body-fluid, or between vessels and fluids; (2) an intimate and firm union of oil, salt, earth and water with these fluids; (3) hence therefore great overloading in the disease; (4) a duration of long prospect; (5) and great danger therein.

APHORISMS ON THE DIAGNOSIS AND CURE OF DISEASES

617. The symptoms of an acute special fever are particularly these: coldness, shivering, anxiety, thirst, nausea, eructation, vomiting, weakness, warmth, flushing, dryness, delirium, coma, sleeplessness, convulsion, sweating, diarrhoea, and inflammatory rash.

1196. If an ulcer of the lungs has so advanced that the whole quality of the body is thence consumed, consumption of the lungs is said to affect the patient.

1197. The origin of this ulcer is traced from any cause which can so stop the blood in the lungs that it is forced to change into purulent material.

GIOVANNI BATTISTA MORGAGNI (1682–1771) *was Professor of Anatomy at Padua and founded the science of Pathological Anatomy. He recorded his discoveries in this field in five books which did a great deal for the orderly classification of diseases.*

DE SEDIBUS ET CAUSIS MORBORUM PER ANATOMEN INDAGATIS

Lib. I. Ep. iv.—Cum celebrem illam apoplexiae divisionem in sanguineam et serosam non improbandam esse scripsimus in earum quas ad te misimus, epistolarum secunda, minime nos fugiebat, quid viros cum inter veteres, tum inter recentiores doctissimos ab agnoscenda serosa apoplexia contineret. Nec vero nos ii sumus, qui, quotiescunque intra apoplectici calvariam aqua invenitur, continuo ab hac ejus morbum repetendum esse existimemus.

Lib. III. Ep. xli.—Juvenis agricola, cujus duo fratres et ipsi juvenes annis superioribus ex acutis morbis circa vernum aequinoctium interierant, eodem anni tempore ad hunc modum decessit. Scabiem sibi, nescio quo adhibito unguento, abegerat, paulo post urina suppressa est, non sine vomitu et dolore interdum ad lumbum sinistrum. Urinam tamen aliquoties postea excrevit, sed paucam et saturati lixivii similem et cum dolore, cujus exitum cathetere expedire nequidquam tentatum est. Tandem corpus universum intumuit, et accedente laboriosa ac magna respiratione postridie, circa vigesimum primum a suppressione diem mors ingruit.

Vesica et renes sani erant, nisi quod hi aliquanto majores, illa autem libras continebat circiter duas urinae ejusmodi, qualem diximus. Sed et in ventris cavo humor stagnabat, urinam olens, ceterum limpidae aquae similis. Qui in vitreo vase asservatus, multa divulsa quasi urinarum contenta exhibuit. Igni autem impositus, primum turbidus est factus et vaccini seri consimilis, mox lactis ipsius, denique sic concrevit, ut ovi albumen prorsus referret, cujus modi concretionem in nullo morbido humore, qui in corpore stagnaret, unquam antea Valsalva viderat.

ON THE SEATS AND CAUSES OF DISEASES INVESTIGATED BY ANATOMY

Lib. I. Letter iv.—When we wrote in the second of those letters which we sent you that the celebrated division of apoplexy into sanguineous and serous (types) is not to be rejected, the reason was far from escaping us which prevented the men alike among ancients and the more modern of the very learned from acknowledging a serous apoplexy. Nor yet are we like those who whenever water is found within the skull of an apoplectic constantly suppose that his disease is to be referred to this.

Lib. III. Letter xli.—A young farmer, whose two brothers themselves young men had died of acute diseases about the spring equinox in previous years, passed away at the same time of year in this fashion. He had got rid of a scurf by applying to himself I know not what ointment; a little after the urine was suppressed with vomiting and pain now and then in the left loin. Yet he passed urine several times afterwards though in small amount, like dark lye, and with pain. Attempts to draw it off by catheter were fruitless. At length the whole body swelled up and the following day, deep laboured breathing coming on, death assailed him about the twenty-first day from the suppression.

Bladder and kidneys were healthy, except that the latter were rather large and the bladder held about two pounds of urine such as we have described. But in the cavity of the belly a humour was collected, smelling of urine and like clear water. This when preserved in a glass vessel showed many fragments as if they were retained from the urine. And set on the fire it became first turbid and like whey, then like milk, and at length so congealed that it straightway produced white of egg, in such a manner as Valsalva had never before seen a condensation in any morbid humour collected in the body.

PERCIVALL POTT (1713–1788) *was one of the most noted of several distinguished surgeons of the English School in the* 18*th century, e.g. Cheselden, Monro, and William and John Hunter. He made many permanent contributions to surgical knowledge on such subjects as fracture of the leg, injuries of the head, hernia, and disease of the spine.*

ON PALSY OF THE LOWER LIMBS, WHICH IS FREQUENTLY FOUND TO ACCOMPANY A CURVATURE OF THE SPINE.—From an attentive examination of these morbid appearances, and of their effects in different subjects, and under different circumstances, the following observations, tending not only to illustrate and explain the true nature of the disease in question, but also to throw light on others of equal importance, may, I think, be made.

1. That the disease which produces these effects on the spine, and the parts in its vicinity, is what is in general called the scrophula; that is, that same kind of indisposition as occasions the thick upper lip, the tedious obstinate ophthalmy, the indurated glands under the chin and in the neck, the obstructed mesentery, the hard dry cough, the glairy swellings of the wrist and ancles, the thickened ligaments of the joints, the enlargement and caries of the bones, &c. &c. &c.

2. That this disease, by falling on the spine, and the parts connected with it, is the cause of a great variety of complaints, both general and local.

12. That this kind of caries is always confined to the bodies of the vertebrae, seldom or never affecting the articular processes.

16. That what are commonly called lumbal and psoas abscesses, are not infrequently produced in this manner, and therefore when we use these terms, we should be understood to mean only a description of the course which such matter has pursued in its way outward, or the place where it makes its appearance externally, the terms really meaning nothing more, nor conveying any precise idea of the nature, seat, or origin of a distemper subject to great variety, and from which variety its very different symptoms and events, in different subjects, can alone be accounted for.

17. That contrary to the general opinion, a caries of the spine is more frequently a cause than an effect of these abscesses.

23. That when two or more vertebrae are affected, forming a large curve, however perfect the success may be with regard to the restoration of health and limbs, yet the curvature will and must remain, in consequence of the union of the bones with each other.

24. That the useless state of the limbs is by no means a consequence of the altered figure of the spine, or of the disposition of the bones with regard to each other, but merely of the caries: of this truth there needs no other proof, than what may be drawn from the cure of a large and extensive curvature, in which three or more vertebrae were concerned: in this the deformity always remains unaltered and unalterable, notwithstanding the patient recovers both health and limbs.

Leopold Auenbrugger (1722–1809), *a Viennese physician, introduced the method of examining the chest by percussion* (1761), *verifying his observations by post-mortem examination.*

Leopoldi Auenbrugger Inventum Novum

I. Thorax sani homini sonat, si percutitur. II. Sonus, quem thorax edit, talis observatur, qualis in tympanis esse solet, dum panno vel alio tegmine ex lana crassiori facto, obtecta sunt. . . . IV. Percuti, verius pulsari thorax debet adductis ad se mutuo, & in rectum protensis digitorum apicibus lente, atque leniter. V. Thoraci supertensum sit indusium, vel manus percutientis chirotheca (modo ex pollito corio non sit) muniatur. VI. Hominem, cujus thoracem percutere voles, primo in naturali respiratione permitte; jube dein, ut aërem inspiratum retineat. Variabilis occurrens percepti soni mutatio, sub inspirato, expirato, & retento aëre, plurimam utilitatem habet, ad ferendum judicium. . . . XI. Si igitur ex praedictis locis sonoris non percipitur sonus manifestus, utrique lateri aequalis, eidemque percussionis intensitati conformis, morbosum quid in pectore latere significat. . . . XII. Si in aliqua thoracis parte sonora eadem intensitate percussa sonus altior; morbosum ibi subesse notat, ubi altitudo major. XIII. Si in aliqua thoracis parte sonora sub eadem intensitate percussa sonus obscurior: morbus in obscurius sonante loco haerebit. . . . Multorum hoc morbo defunctorum cadavera aperui; & inveni semper pulmones pleurae firmiter accretos: lobum vero ex latere non sonante callosum induratum, plus minusve purulentum.

R. T. H. Laënnec (1781–1826), *an army-surgeon and later physician at the Hospital Necker in Paris and Professor of Medicine to the*

Traité de l'Auscultation Médiate

Bruit respiratoire pulmonaire.—Si l'on applique sur la poitrine d'un homme sain le stéthoscope dégarni de son obturateur, on entend, pendant l'inspiration et l'expiration, un murmure léger mais extrêmement distinct, qui indique la pénétration de l'air dans le tissu pulmonaire et son expulsion. Ce murmure peut être comparé à celui d'un soufflet dont la soupape ne ferait aucun bruit, ou mieux encore à celui que fait entendre à l'oreille nue un homme qui, pendant un sommeil profond, mais paisible, fait de temps en temps une grande inspiration.

. . . Le râle *crépitant humide* est un bruit que se passe évidemment dans le tissu pulmonaire. On peut le comparer à celui que fait du sel que l'on fait décrépiter à une chaleur douce dans une bassine, à celui que donne une vessie sèche que l'on insuffle, ou mieux encore à celui que fait entendre le tissu d'un poumon sain et gonflé d'air que l'on presse entre les doigts: il est seulement un peu plus fort que ce dernier; et, outre la crépitation, il porte avec lui une sensation d'humidité bien marquée. . . . Il est le signe pathognomonique de la péripneumonie au premier degré; il cesse de se faire entendre dès que le poumon a acquis la dureté hépatique, et reparaît lorsque la résolution se fait.

AUENBRUGGER: INVENTUM NOVUM

I. The chest of a healthy man sounds, if it is struck. II. The sound which the chest gives out is noticed to be like that usual in drums when covered with a cloth or other covering of rather coarse wool. . . . IV. The chest should be struck or rather beaten slowly and gently with the points of the fingers brought all together and stretched straight out. V. A covering may be drawn over the chest, or the hand of the percussor may be furnished with a glove (but it must not be of smooth leather). VI. Allow the man whose chest you wish to percuss, first to take a natural breath; then tell him to keep in the air. The varying change in sound perceived on breathing in, breathing out, and holding the breath, has the greatest use in forming a judgment. . . . XI. If therefore a distinct sound is not perceived in the places mentioned as resonant, if it is not equal on the two sides though the force of percussion is the same, it means some disease in the side of the chest. . . . XII. If in some resonant part of the chest struck with the same force the sound is of higher pitch, it indicates that some disease underlies the place of higher pitch. XIII. If in some resonant part of the chest struck with the same force the sound is more muffled, disease will lurk in the more muffled-sounding place. . . . I have opened the bodies of many dead of this disease; and found always the lungs firmly adherent to the pleura; and, on the side which did not resound, a lobe hard, indurated, and more or less purulent.

College of France, invented the stethoscope and elaborated the method of examining the chest by auscultation in his "Traité de l'auscultation médiate" (1819).

LAËNNEC: TREATISE ON MEDIATE AUSCULTATION

RESPIRATORY PULMONARY SOUND.—If one applies the stethoscope stripped of its obturator to the thorax of a healthy man one hears during inspiration and expiration a light but extremely distinct murmur, which indicates the entrance of the air into the lung-tissue and its expulsion. This murmur may be compared to that of a bellows of which the valve makes no noise, or better still to that which is heard by the unaided ear when a man during profound but peaceful sleep draws from time to time a deep breath.

. . . The *crepitant moist* râle is a noise which evidently arises in the lung-tissue. One may compare it to that which is made by salt that one causes to break down at a gentle heat in a pan, to that which a dry bladder gives when one blows it up, or better still to that which is heard when one squeezes between the fingers the tissue of a lung that is healthy and puffed up with air: it is only a little stronger than the last; and, beyond the crackling, it carries with it a well-marked sense of moistness. It is the pathognomonic sign of peripneumonia in the first stage; it ceases to make itself heard as soon as the lung has become hepatized, and it reappears when resolution takes place.

Medicine among the Assyrians and Egyptians in 1500 B.C.

INTRODUCTORY LECTURE UPON THE HISTORY OF MEDICINE.

BY

JOHN D. COMRIE, M.A., B.Sc., M.B., F.R.C.P.,
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If one asks where the beginnings of the healing art may be sought, one must look, so far as Western Medicine is concerned, to those nations that inhabited the valleys of the Euphrates and of the Nile, long before the people of Britain had reached even that state of gentle savagery in which the Romans found them, and which Macaulay describes as akin to the modern condition of the Sandwich Islanders.

When we turn to the fertile plains north of the Persian Gulf, we find that the origin of Assyrian Medicine is lost in a remote antiquity, and when we first become acquainted with it, we discover it mixed to a great extent with magic. I use the term Assyria here in a generic sense, to indicate those lands inhabited by peoples of Semitic race who contended for many centuries with one another for the plains of the Euphrates and the Tigris, and who strove for mutual annihilation with a determined ferocity before which to-day we stand appalled. Long before the twentieth century B.C., a Tartar or Scythian people with dolicho-cephalic skulls, who had previously inhabited the country from the Caucasus to the Indian Ocean, and from the Mediterranean to the mouth of the Ganges, were retreating before the waves of a Semitic race whose various tribes spread northwards from Chaldea. This Scythian people is still preserved throughout the central part of Asia and in corners of Europe, among the Lapps, Finns and Hungarians. Their Semitic supplanters founded the kingdoms of Babylon about 3000 B.C. or earlier, that of Assyria, about 1000 years later, spread with Abraham and his followers to Palestine, and migrated to colonies in Phœnicia, Carthage, Sicily, Spain and Western Africa.

There are many evidences that the healing art among these peoples was one of usefulness, honour and profit. One of the most important results of explorations in Assyria has been the discovery in the palace of Assur-bani-pal (668-626 B.C.), at Nineveh, of a large library, consisting of many thousand tablets of baked clay, inscribed with cuneiform characters and now preserved in the British Museum. This library probably owes its origin to the keen political insight of Esar-haddon (681-668 B.C.), father of Assur-bani-pal and conqueror of Egypt, who desired to prevent the youth of Assyria from going to be taught at Babylon or Borsippa, where they would be subjected to dangerous political influences. Careful study has made it evident that many of the tablets in this library are copied from ancient originals in the temple libraries of Chaldea, each being stated to be "like its old copy" or "like the ancient tablets of Sumir and Akkad." Many of these tablets have been found duplicated in the libraries of other Babylonian cities, and thus the original composition must be referred to a much earlier date.

Nineveh, after maintaining an independent existence as the capital of Assyria from about 2000 years B.C. was totally destroyed when Assyria became a Median province in 606 B.C., and has remained a ruin from then till the present day. Xenophon, passing it in the Retreat of the Ten Thousand, mentions the desolate vastness of the ruined city with walls 150 feet in height.[1]

At the period with which I intend principally to deal so far as Egypt is concerned (1500 B.C.), and all through the subsequent history of Assyria, there was much intercourse between these countries and a regular trade route with letter-posts ran from Memphis by way of Palestine and Carchemish to Nineveh. The diplomatic language in which the letters were written was that inscribed by cuneiform characters impressed with a three-cornered stylus upon clay tablets as in these tablets found at Tel el-Amarna.

The library of Assur-bani-pal found at Nineveh contained text-books on geography, mathematics and natural history, together with poems and records of kings; and we may judge of the important position occupied by the healing art from the fact that out of the total 20,000 tablets between 500 and 1000 are stated by Oefele to consist of medical works.[2]

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[1] Xenophon, *Anabasis*, iii., iv., § 10.

[2] *Keilschriftmedizin; Abhandlungen zur Geschichte der Medizin*, von Felix Freiherrn von Oefele, Breslau, 1902, p. 19.

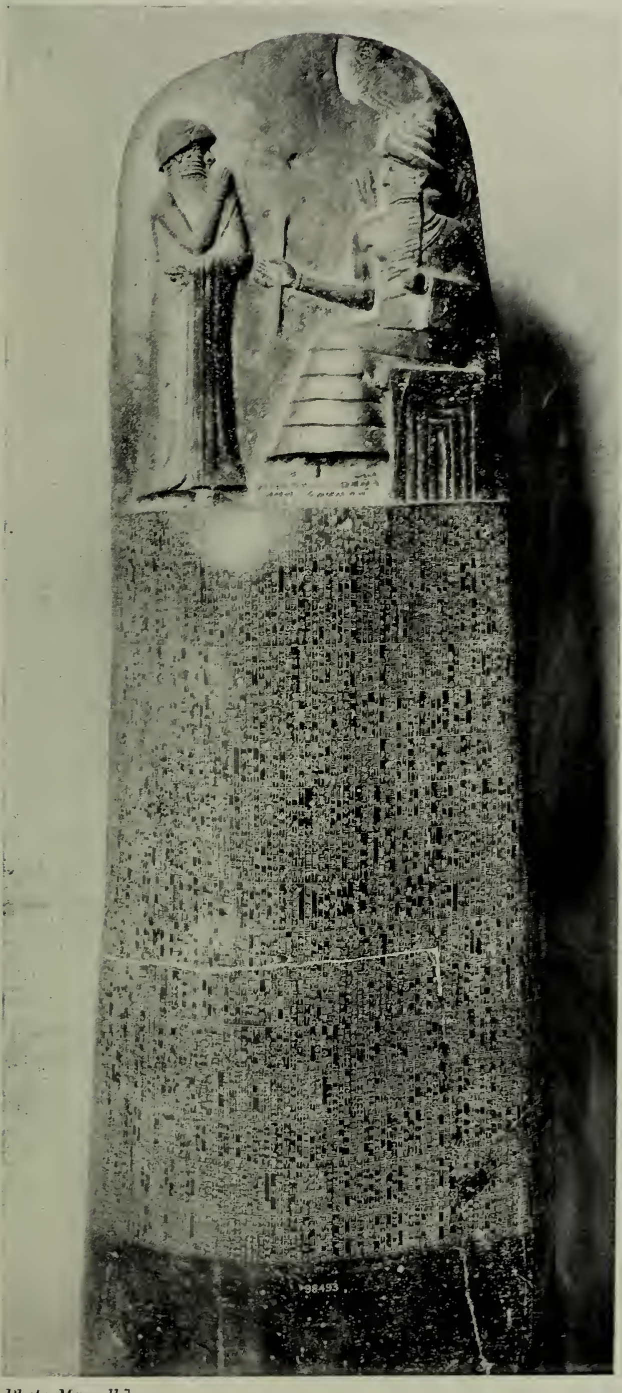

Photo Mansell.]

I.—The Code of Hammurabi (2200 B.C.).

The following are a few prescriptions taken from the German translation by Küchler of these tablets.[1] They are merely fragments left by the Babylonian sackers of Nineveh and there is the same difficulty in translating technical words that is found with regard to papyri recording the medicine of Egypt. Between the two there is a strong family resemblance.

I. 11-16, page 3:—

"If a man is ill with colic, thou shalt have him placed upon his feet; pour upon him decoction of hypericum; so will he recover.

"Or in the same case, let him kneel down and crouch upon his heels, and thou shalt let cold water run upon his head.

"Or in the same case if there be faintness, thou shalt lay his head below and raise his feet. Beat upon his buttocks, and say, 'May it be well.' With thy thumb strike fourteen times upon his head, and upon the ground."

Many of the prescriptions are intended for the relief of what must have been a common complaint at Nineveh, the results of over-indulgence in food and drink.

I. 14, page 43:—

"When a man is bilious, thou shalt rub down onion; he shall drink it in water without eating."

The following is a prognostic point in jaundice:—

III. 4-5, page 55:—

"If a man is sick with jaundiced eye, and the disease mounts to the interior of the eye so that the water from his eyes is green like copper, his inner parts rise up and he brings back meat and wine, the disease dries up his whole body, so will he die."

Among the easily identified substances prescribed in these cuneiform tablets are sesame, olive and castor oils, syrup of dates, honey and salt; fasting was very commonly ordered; while the use of massage and of enemata appears to have been known.

Borsippa, a suburb of Babylon, where another library had been established in the temple of Nebo, was, as we learn from Strabo, the seat of a university which had attained great celebrity. From a fragment of a Babylonian medical work, now in the British Museum, Professor Sayce states: "We may perhaps infer that it was chiefly celebrated as a school of medicine."[2]

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[1] *Beiträge zur Kenntniss der Assyrisch-Babylonischen Medizin*, von Friedrich Küchler, Leipzig, 1904.

[2] *Babylonians and Assyrians*, by A. H. Sayce, M.A., 1900, p. 54.

In Babylon the physician is mentioned at a very early date. Thus we hear of Ilu-bani, the physician of Gudea and High Priest of Lagas, at a period about 2700 B.C.[1]

In the Code of Laws promulgated by Hammurabi, a king of the First Dynasty of Babylon, dating from *c.* 2000 B.C., we find that not only is the doctor mentioned, but his remuneration is fixed by law. I shall read a few clauses bearing on this profession from the translation by the Rev. C. H. W. Johns:—[2]

"215. If a doctor has treated a gentleman for a severe wound with a bronze lancet, and has cured the man, or has opened an abscess of the eye for a gentleman with the bronze lancet, and has cured the eye of the gentleman, he shall take ten shekels of silver.

"216. If he (the patient) be the son of a poor man he shall take five shekels of silver.

"217. If he be a gentleman's servant the master of the servant shall give two shekels of silver to the doctor.

"218. If the doctor has treated a gentleman for a severe wound with a lancet of bronze, and has caused the gentleman to die, or has opened an abscess of the eye for a gentleman with the bronze lancet, and has caused the loss of the gentleman's eye, one shall cut off his hands.

"219. If a doctor has treated the severe wound of a slave of a poor man with a bronze lancet, and has caused his death, he shall render slave for slave.

"220. If he has opened his abscess with a bronze lancet, and has made him lose his eye, he shall pay money, half his price.

"221. If a doctor has cured the shattered limb of a gentleman, or has cured the diseased bowel, the patient shall give five shekels of silver to the doctor.

"222. If it is the son of a poor man, he shall give three shekels of silver.

"223. If a gentleman's servant, the master of the slave shall give two shekels of silver to the doctor."

These laws are interesting as indicating the definite social position enjoyed by the medical profession at this early period. The remuneration is good, considering the much greater purchasing power in those days, the shekel being practically equivalent to half a crown. We may note, in passing, that the physician was a man of substance, and the possessor of slaves. The reference to treating the abscesses with a bronze lancet is of extreme interest. I have corresponded with the Rev. C. H. W. Johns, of Queen's College, Cambridge, the translator of this Code, regarding the significance of this word abscess. He tells me that the word "nagabtu," meaning "hollow" or "well," connected etymologically with "nagabu," had been taken by him to be metaphorically applied to a "running sore." Now it is unlikely that any abscess of the eyeball would be treated by a practitioner with a lancet, or that the destruction of the eye would be punished, under a reasonable code of laws, in so severe a manner; for an abscess in the eyeball destroys the sight and appearance of the eye before any treatment is called for. An abscess in the orbit, on the other hand, such as might be caused by an arrow or other missile, would of itself be a trivial matter, not requiring operative treatment, and not liable to cause destruction of the ball. Therefore the rarity of treatment required by either of these conditions would render it unlikely that they should be mentioned in a concise code. I have suggested to Mr. Johns that this may possibly be a reference to a primitive operation for cataract.[1] It is well known that in India, not many years ago, the criminal authorities experienced much difficulty in dealing with the native operators for this condition. These men would arrive at a village, operate upon the persons there afflicted with cataract, and, by couching or depressing the lens, restore the lost vision in some degree, to the delight of the patients and of their friends. Then, collecting the fees, they would move off, while the eyes in a few days suppurated and were totally destroyed, It is likely that the penalties of Hammurabi are directed against unscrupulous practice of this sort. We know that the operation of "couching" a cataractous lens is a common one among primitive peoples, the lens being simply depressed to the lower part of the vitreous humour by means of a needle pushed in outside the margin of the cornea. The Assyrian, also, as we know, could have fitted patients thus operated upon with the necessary spectacles, for they were acquainted with the principles of optics, and Layard discovered a lens among the ruins of Nineveh.

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[1] *Babylonians and Assyrians*, by A. H. Sayce, M.A., 1900, p. 162.

[2] *The Oldest Code of Laws in the World*, translated by C. H. W. Johns, M.A. Edinburgh, 1905.

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[1] The learned translator of the Code kindly writes to me as follows:—"I certainly think that the balance of probability is in favour of cataract, . . . and I think you can fairly say: 'Taking into consideration the present state of lexicography, and having regard to the possible pathological circumstances, the probability is that it was an operation for cataract, but it is difficult to see exactly what phase of the operation is expressed by the words, "open the nagabtu."'" I find also that Baron von Oefele holds the view that a cataract operation was performed by these people. See his *Keilschriftmedizin in Parallelen*, Leipzig, 1904, p. 21.

At the head of the profession in Babylon stood the Rab-mag or Court physician, and under him numerous other doctors are mentioned in the records of Babylon, Nineveh and Tel-el-Amarna. The following translation of a letter from a certain Arad-nana, who seems to have been a consulting physician to Esar-haddon (700 B.C.), is interesting:—[1]

"As regards the patient who had bled through the nose, the Rab-mag reports:—'Yesterday, toward evening, there was a good deal of hæmorrhage; the dressings have not been properly applied. They have been placed outside the nostrils, oppressing the breathing and coming off when there is hæmorrhage. Let them be put inside the nostrils, and then the air will be excluded and the hæmorrhage stopped. If it is agreeable to my lord the King, I will come to-morrow and give instructions; meantime let me know how the patient is.'" So much for medical etiquette in Assyria! Three other letters from Arad-nana are also extant.

Apart from the physicians, we learn from Herodotus that it was a common custom at Babylon to lay the sick in the public square, so that passers-by who had suffered from similar complaints might give them advice as to remedies that had proved beneficial in their own case.[2]

If we turn to early Greek literature we find that in the *Iliad* and *Odyssey*, composed somewhere about 1000 B.C., and referring to events of some centuries previous (about 1200 B.C.), there are references to the physicians of Egypt; for example, when Telemachus comes to visit Menelaus: "Helen, daughter of Zeus, turned to new thoughts. Presently she cast a drug into the wine whereof they drank, a drug to lull all pain and anger and bring forgetfulness of every sorrow. Whoso should drink a draught thereof, when it is mingled in the bowl, on that day he would let no tear fall down his cheeks, not though his mother and his father died, not though men slew his brother or dear son with the sword before his face and his own eyes beheld it. Medicines of such a virtue and so helpful had the daughter of Zeus, which Polydamna, the wife of Thon, had given her, a woman of Egypt, where earth, the grain-giver, yields herbs in greatest plenty, many that are healing in the cup and many baneful. There each man is a leech, skilled beyond all human kind; yea, for they are of the race of Paeëon."[3]

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[1] *Babylonians and Assyrians*, by Rev. A. H. Sayce, M.A., p. 218.

[2] Herodotus, i. 197.

[3] *Odyssey*, iv. 229 f.

The following brief chronological table is based upon Breasted (*History of the Ancient Egyptians*, London, 1908), and agrees with Meyer's *Ægyptische Chronologie.* This system of dates has been followed in the present article:—

First Dynasty from	3400	B.C.
Khufu builds Great Pyramid	2900	„
Fifth Dynasty from	2700	„
Eleventh Dynasty from	2160	„
Eighteenth Dynasty (New Empire) from	1580	„
Exodus of Israel (?)	1209	„
Herodotus born	484	„

The Egyptians apparently set great store by the medical profession. The practitioners of this art belonged to the priestly class, though they were not priests, and they seem to have been not only men of high social standing, but men of wealth and substance, who were regarded as devotees of Thoth, the scribe of the gods and prototype of Hermes. This is indicated both by the monuments that have been erected to some of them, and by the elegant papyri they possessed. That they occupied a position of great respect and influence is proved by numerous references.

I-em-hotep was probably a distinguished physician who flourished before the end of the Third Dynasty (3000 B.C.); his name signifies "he who cometh in peace," and as the Egyptian tended to deify any historic character of a beneficent nature and to convert to a demon any unpopular personality, so at the period with which I propose chiefly to deal (1500 B.C.) his worship had become popular and fashionable at Memphis; and under the Ptolemies a small temple was built in his honour upon the island of Philae. He was the god who sent sleep to those in pain; those afflicted with disease formed his special charge; he was the good physician both of gods and men; and he healed their bodies during life and superintended the arrangements for their preservation after death. The Greeks, who called him Ἰμοῦθης, identified him to some extent with Asklepios and gave his temple at Memphis the name τὸ Ἀσκληπίειον.[1]

Nenekhsekhmel was chief physician to one of the kings of the Fifth Dynasty (B.C. 2700). His tomb at Sakkarah bears an inscription recording the favour shown by Pharaoh to him for his services, and a portrait, from the robes and adornments of which his high social standing may be gathered.[1]

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[1] *The Gods of the Egyptians*, by E. A. Wallis Budge, M.A., vol. i. p. 522.

So much were the services of Egyptian physicians prized that they were found in various foreign courts. Herodotus tells us that an Egyptian eye doctor at the Court of Cambyses, king of Persia, who bore a grudge against Amasis, king of Egypt, enjoyed so much influence with the Persian king that he successfully incited Cambyses to attack Egypt and thus led to the conquest of this country by the Persians.[2]

Cyrus (the Great)—*circa* 530 B.C.—as we are told by Xenophon, "collected round him the very best physicians, and whatever instruments, medicines, meats or drinks any one of them told him would be of use, there was not one of them he did not provide for himself and treasure up. And when any of those of whom it was proper for him to take care fell ill, he went to see them and furnished them with whatever they wanted, and was thankful to the physicians whenever they wrought a cure on anyone, and took the things with which they effected it from his store."[3] These were undoubtedly Egyptians and Greeks.

We may, therefore, conclude that in the early days of Egypt the medical practitioners belonged to a learned class, enjoyed a high social position, and were in many cases the friends and councillors of kings. More than this, we may, I think, assume that they laboured, and laboured successfully, to alleviate human misery and to soothe human suffering.

We must remember that, though their knowledge of the healing art was a purely empiric one, and though they were entirely ignorant of the principles of physiology and even of the simplest systematic anatomy, yet their use of these remedies was the fruit of the experience of many centuries; and their knowledge of pathology, derived from the constant examination of the bodies of those who died, must have conferred upon them great skill in diagnosis. Upon this point all the testimony of antiquity accords.

The record of this knowledge has come down to us in part through various papyri. We know from the statement of Clement of Alexandria[1] that the sacred books of Thoth, preserved in the temples and known as the Hermetic Books, were forty-two in number, of which thirty-six dealt with philosophy and six with medicine. The names of the latter were:—

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[1] *Medical History from the Earliest Times*, by E. T. Withington; also *Life in Ancient Egypt*, by Adolf Erman, translated by H. M. Tirard, 1894, p. 319. For the inscription, see *Ancient Records of Egypt*, by J. H. Breasted, Ph.D., 1906, vol. i. p. 108.

[2] Herodotus, iii. 1.

[3] Xenophon, *Cyropædia*, bk. viii., ch. 2, 24, 25.

(1) On the constitution of the body.
(2) On disease.
(3) On instruments.
(4) On drugs.
(5) On the eye.
(6) On (diseases of) women.

These Hermetic Books, which were carried by pastophori, or priest physicians, in the sacred processions, have unfortunately all been lost: but we know a great deal regarding the actual methods of the physician from some medical papyri which have come down to us.

Of these the chief are:—

1. The Papyrus Ebers, preserved at Leipzig, discovered by Professor Ebers in Egypt in 1872. It dates from about 1500 B.C., and consists of 110 pages.

2. The Berlin Medical Papyrus, published by Dr. Brugsch. It dates from about 1300 B.C., and contains 21 pages. There is also a smaller one in the Berlin Museum, of 15 pages.

3. The Kahun Papyrus, published by F. L. Griffith. It dates from about 2000 B.C., but is a short papyrus, consisting of only 3 pages.

4. The Hearst Medical Papyrus, preserved in the University of California, and published by Dr. George A. Reisner. It consists of 17 pages.

5. The British Museum Medical Papyrus. It has not yet been published, but Dr. Wallis Budge, keeper of the Egyptian and Assyrian antiquities in the British Museum, tells me he hopes it will shortly be issued by the trustees of this institution. It dates, probably, from about 1000 B.C.

6. There are also papyri of medico-magical contents in the museums at Leyden, Turin, Cairo and Paris, but these are said

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[1] Clement of Alexandria, *Stromata*, vi. 634. δύο μὲν οὖν καὶ τεσσαράκοντα πάνυ ἀναγκᾶιαι τῷ Ἑρμῇ γεγόνασι βίβλοι · ὧν τὰς μὲν λς τῶν πᾶσαν Αἰγυπτίων περιεχούσας φιλοσοφίαν, οἱ προειρημεθύοι ἐκμανθάνουσι · τὰς δὲ λοιπὰς ἓξ οἱ παστοφόροι, ἰατρικὰς οὖσας, περὶ τε τῆς τοῦ σώματος κατασκευῆς, καὶ περὶ νόσων, καὶ περὶ ὀργάνων καὶ φαρμάκων, καὶ περὶ ὀφθαλμοῦ, καὶ τὸ τελευτᾶιον περὶ τῶν γυναίκων.

to be of little value as regards our knowledge of Egyptian medicine.[1]

My remarks regarding medical practice in Egypt, except when otherwise mentioned, refer to the period of the 18th Dynasty, that is the 16th century B.C. At this time, known as the beginning of the New Empire, Egypt stood at the zenith of her glory. Her Pharaohs exacted tribute, and her armies marched unhindered from the Libyan desert to the Euphrates, and in this state of external peace and domestic felicity there was opportunity for intercourse with outside nations, *e.g.* the dwellers in Greece and Crete, for great advance in the technical arts, and for sending forth exploring expeditions which brought back treasure and strange animals from the sacred land of Punt at the sources of the Nile.

This period is to be placed two centuries and a half before that epoch familiar to us for the Exodus of Israel from Egypt. To it belong some of the chief literary and monumental remains of this country, and during it the Egyptians attained to a level of thought and of executive skill which they did not at any time surpass, save under Greek influence in the Ptolemaic period, more than a thousand years later. I show you here some small fragments from the wreck of this great civilisation.

An alabaster mortar for bruising drugs, and a bronze basin which may have been used for storing roots or herbs were shown here as examples of the vessels of the period. These and also several predynastic vessels of polished stone were kindly lent for demonstration by Mr. D. C. Robertson.

SURGICAL KNIVES AND SPATULA.

These knives were purchased by Mr. D. C. Robertson near Thebes in 1890, and were by him presented to Dr. Affleck, who has kindly lent them to me. Professor Sayce, who was present when they were bought, unhesitatingly pronounced them to belong to this period. They were found in a tomb of the 18th dynasty (*circa* 1500 B.C.). I have submitted them also to Dr. Wallis Budge, and he, while admitting that they possibly belong to this

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[1] For numerous interesting comments upon several of these papyri, see a series of articles in the *British Medical Journal*, 8th April, 13th and 20th May, 1893, by James Finlayson, M.D. See also the introduction to Joachim's German translation of the *Papyros Ebers*. Also *Recueil des Monuments égyptiens*, par Henri Brugsch, deuxième partie, Leipzig, 1863 (for the Berlin Papyrus). Also *Hieratic Papyri from Kahun and Gurob*, by F. L. Griffith, London, 1898 (for the Kahun Papyrus). Also *The Hearst Medical Papyrus*, University of California Publications, vol. i.

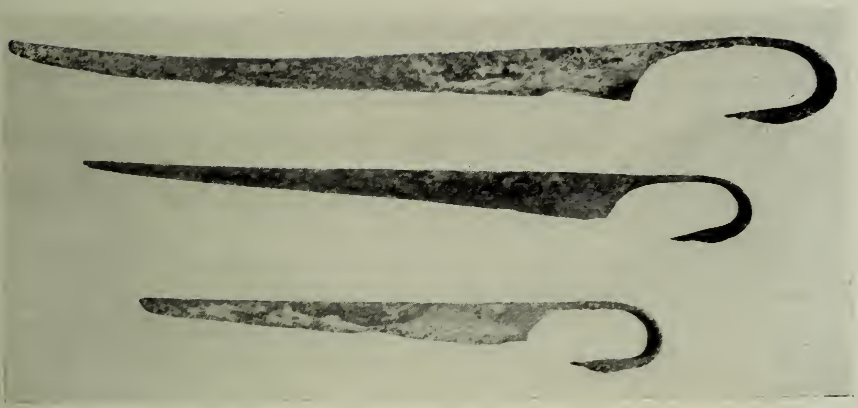

Photo J. D. C.]

II.—Bronze Knives of the Eighteenth Dynasty (1500 B.C.), supposed to be surgical.

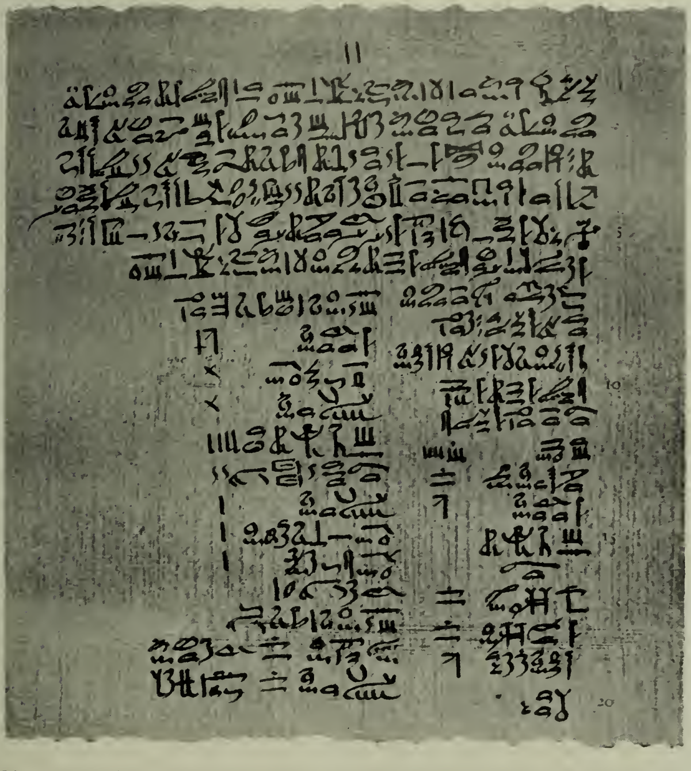

Photo J. D. C.]

III.—Prescriptions on second page of Papyrus Ebers (1550 B.C.).

period, is inclined to think that the shape indicates a later date. One finds in the papyrus of Ani[1] (1500-1400 B.C.) a picture of Ra, incarnated as a cat, amputating the head of the Serpent of Darkness with a knife, in shape very closely resembling the largest of these three. Probably, therefore, the difficulty with regard to shape need not weigh too much in the estimation of their date. As to their use, the Arab from whom Mr. Robertson purchased them stated that they were found in an amphora along with other instruments, which he showed to Mr. Robertson. That gentleman tells me these resembled surgical or obstetric forceps, although, unfortunately, he did not purchase them. The knives are well adapted for the performance of those operations which were carried out by the Egyptian physicians of this period, and to which I shall refer later. They could not have been concerned with the process of embalming or with that of sacrifice, for which flint knives were always used, in accordance with ancient custom.[2] I think for these various reasons we may safely conclude that they were intended for surgical use.

COPPER CHISELS

are of special interest, because they indicate a lost art. They consist of pure copper, containing a little native arsenic; but they have been hardened by some forgotten process, so that they were capable of being used for cutting those beautiful hieroglyphics in hard granite that have withstood the tooth of time for thousands of years.[3] Professor Sayce has showed me in his collection several chisels of which the head presents the dints of hammering, while the edge is perfect and unturned.

A FACSIMILE OF THE EBERS PAPYRUS.

The date of the compilation of this is assigned by Professor Ebers to the time between 1553 and 1550 B.C., from a calendar on the back of one of the pages.

The Egyptians, who held the sacredness of the human body an essential part of their religion, were a most cleanly people. Their dress, at this period, consisted of a simple white linen stole or stole and kilt, the head and legs were bare, and the feet shod simply with light sandals. Their ablutions were frequent, and Herodotus,[1] describing the customs of a somewhat later date, states that "for three successive days in each month, they purge the body by means of emetics and clysters, which is done out of a regard for their health, since they have a persuasion that every disease to which men are liable is occasioned by the substances whereon they feed." According to Pliny[2] the habit of taking enemata was a sacred rite which the Egyptians had learned from their sacred bird the ibis. In this, however, he had probably confused the ibis with the god Thoth, whose symbol the bird was, and who was the supposed writer of the sacred Hermetic Books. In these rules of health we have an explanation of many prescriptions which I shall touch upon in describing the Ebers Papyrus, and which appear to have been directions for the dietary in different diseases. I may mention here, that their ordinary diet, as quoted by Herodotus, consisted of bread, wine, many kinds of fish, either raw, salted, or boiled; ducks, quails, and other small birds uncooked but salted, and various larger birds and fish, except those set apart as sacred, either roast or boiled. Herodotus, in another place, refers to the dietary of the labourers engaged upon the pyramids, as consisting of radishes, onions and garlic, which cost, he says, in the case of the Great Pyramid, 1600 talents of silver.

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[1] *The Book of the Dead; The Papyrus of Ani*, published by the British Museum, plate 10, chapter xvii.

[2] Herodotus, ii. 86. See also *Burial Customs of Ancient Egypt*, by John Garstang, M.A., F.S.A., 1907, pp. 106, 107.

[3] See *A History of Egypt*, by J. H. Breasted, 1906, p. 93.

When the Egyptians became sick they called in a physician. At the time of which Herodotus writes, about 500 to 450 years B.C., he says:—[3]

"Medicine is practised among the Egyptians on a plan of separation; each physician treats a single disorder and no more. Thus the country swarms with medical practitioners, some undertaking to cure diseases of the eye, others of the head, others again of the teeth, others of the intestines, and some those which are not local." These physicians received their preliminary training in the temples, no doubt, and Josephus[4] quotes the statement of Manetho, that Moses was a priest at Heliopolis, a great medical centre of his time. The physicians received salaries from the treasury, paid, doubtless, from the temple funds, and supplemented by their private fees. According to the statements of several ancient writers, they were obliged to conform their treatment to that prescribed by the Hermetic Books, the patient's death being a capital crime, if he was found to have been treated in any other way. Aristotle says:—[1]

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[1] Herodotus, ii. 77.

[2] Pliny, *Nat. Hist.*, viii., ch. 27. "Simile quiddam et volucris in eadem Ægypto monstravit, quae vocatur Ibis; rostri aduncitate per eam partem se perluans, qua reddi ciborum onera maxima salubre est. Nec hace sola a multis animalibus reperta sunt, usui futura et homini."

[3] Herodotus, ii. 84.

[4] Josephus, *Contra Apionem*, i. 26.

"The Egyptian physicians were allowed after the fourth day to alter the treatment prescribed by authority and even before, taking upon themselves the responsibility." These regulations, however, were almost certainly intended merely as a safeguard against gross quackery and imposition, not to be applied with absolute rigidity.

The physicians were, as I have stated, not simply priests, and, on the other hand, they are not to be confused with the embalmers, who at Thebes were a low class of men, dwelling in a poor quarter of the city. Some confusion has arisen on this point, because of the statement in Genesis l. 2: "And Joseph commanded his servants the physicians to embalm his father, and the physicians embalmed Israel.

"3. And forty days were fulfilled for him, for so are fulfilled the days of those which are embalmed: and the Egyptians mourned for him threescore and ten days."

Referring to the Septuagint version of the Old Testament made at Alexandria during the reign of the Pharaoh Ptolemy Philadelphus about 250 B.C., I find that the Alexandrian translators have rendered the Hebrew word by ἐνταφιασταῖς or "entombers," instead of employing some such word as ἰατροῖς. Thus they evidently recognised the distinction of the two classes as essential.

I consulted Professor Kennedy on this point, and he has very kindly written to me in support of my supposition.[2]

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[1] Aristotle, *Politics*, iii. 15.

[2] Professor Kennedy writes:—"As to the Hebrew text of Genesis l. 2, the original is correctly translated in our version; the word rendered 'physicians' is the word always so rendered; the word to embalm is Hebrew *khanat*, which literally means 'to treat with spices.' The kindred Arabic word *khannata* also means to embalm. The word which Herodotus uses in book ii., chaps. 86 ff., is ταριχεύω, literally, 'to pickle' (in salt)—a word always used for curing fish!

"In the Greek translation of Genesis made in Alexandria (*circa* 250 B.C.) the verb khanat is rendered by ἐνταφιάζω, as you know, and the word for physicians by the corresponding noun ἐνταφιάστης. The verb ἐνταφιάζω, from τάφος, the tomb, occurs in Matthew xxvi. 12, and John xix. 40, meaning 'to prepare (the body) for burial by the use of every requisite provision and funeral adornment, to wit, baths, vestments, flowers, perfumes, &c.' (*cf.* the noun ἐνταφιασμός, Mark xiv. 8; John xii. 7).

"In Deissmann's *Bible Studies*, page 120 f., I find the following with reference

Diodorus Siculus[1] states that so unpopular were the embalmers that when the incision had been made in the side preparatory to removing the organs, the man who made the cut was driven from the house with curses, pelted with stones and otherwise maltreated. This was the *parachistes* who made the cut. On the other hand, he says that the *taricheutes*, who removed the organs and prepared the body, was reverenced as being of the priestly class. It is most unlikely that such an event ever occurred in all seriousness, for the work of embalming was universal and must have become quite natural to the Egyptian mind. Probably the actions thus reported were of a mere formal character, like others with which all Egyptian ceremonies abounded. In any case, the *parachistes* and *taricheutes* seem to have belonged to the same class, though both differ from the *pastophoroi* mentioned by Clement of Alexandria in the passage quoted above. The latter were a high grade of priests, who preserved the medical (Hermetic) books, and carried them in procession through the streets upon sacred occasions. They were also supposed to know the contents of these books by heart.

The organs were removed from the body through an opening in the side, and no doubt the physicians who had attended the case during life were often, if not always, present. It is quite a simple matter to remove the abdominal organs intact through a small opening in the side, while the thoracic organs can be reached with but little more difficulty. Thus the Egyptian physician had probably unrivalled opportunity for increasing his knowledge of morbid anatomy, upon which skill in diagnosis is undoubtedly most surely founded. Pliny, referring most likely to Ptolemaic times, states that post-mortem examinations were carried out in Egypt for the very purpose of investigating diseases.[2]

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to Genesis l. 2, in the LXX. (Septuagint). The translation of (rophe') physician by ἐνταφιαστής 'is explained by the endeavour to introduce a term better suited to Egyptian conditions (*i.e.* embalming). But the professional designation of the person entrusted with this work was ἐνταφιαστής.' Deissmann quotes Pap. Par. 7 (99 B.C.), which is a reference to a collection of papyri in the Bibliothèque Nationale at Paris. He also refers to Lombroso, *Recherches sur l'économie politique de l'Egypte, &c.*, Turin, 1870, p. 136 f.

"Driver, in his commentary on Genesis, says: 'The embalmers (ταριχευταί) formed, however, a distinct profession, so that the term physicians does not seem to be used quite exactly, still . . . some knowledge of anatomy and of the drugs necessary for the preservation of bodies would be required by the embalmers.'"

[1] Diodorus Siculus, lib. i. 82.

[2] Pliny, *Nat. Hist.* xix. ch. 5: ". . . Compertum sit in Ægypto, regibus corpora mortuorum ad scrutandos morbos insecantibus."

As the process of embalming is an interesting one connected with medicine indirectly, I may make brief mention of it here. The account of Herodotus has been proved by recent researches to be so substantially correct that I shall quote it. His knowledge of the matter was obtained from the priests of Egypt, during a visit to that country in the fifth century B.C.; but as the ceremonies varied little from century to century in Egypt, we may assume that the account presented would give a fair picture of the process at the period of which I am treating.[1]

"II. 86. There are a set of men in Egypt who practise the art of embalming and make it their proper business. These persons, when a body is brought to them, show the bearers various models of corpses made in wood and painted so as to resemble nature. The most perfect is said to be after the manner of him[2] whom I do not think it religious to name in connection with such a matter; the second sort is inferior to the first and less costly; the third is the cheapest of all. All this the embalmers explain, and then ask in which way it is wished that the corpse should be prepared. The bearers tell them, and, having concluded their bargain, take their departure, while the embalmers left to themselves proceed to their task. The mode of embalming according to the most perfect process is the following:—They take first a crooked piece of iron and with it draw out the brain through the nostrils, thus getting rid of a portion, while the skull is cleared of the rest by rinsing with drugs; next they make a cut along the flank with a sharp Ethiopian stone and take out the whole contents of the abdomen, which they then cleanse, washing it thoroughly with palm wine and again frequently with an infusion of pounded aromatics. After this they fill the cavity with the purest bruised myrrh, with cassia, and every sort of spicery except frankincense, and sew up the opening. Then the body is placed in natrum for seventy days and covered entirely over. After the expiration of that space of time, which must not be exceeded, the body is washed and wrapped round from head to foot with bandages of fine linen cloth smeared over with gum, which is used generally by the Egyptians in the place of glue. And in this state it is given back to the relations, who enclose it in a wooden case which they have had made for the purpose, shaped into the figure of a man. Then fastening the case, they place it in the sepulchral chamber upright against the wall. Such is the most costly way of embalming the dead.

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[1] Herodotus, in Rawlinson's translation.

[2] Osiris.

"87. If the persons wish to avoid expense and choose the second process, the following is the method pursued:—Syringes are filled with oil made from the cedar tree, which is then without any incision or disembowelling injected into the abdomen. The passage by which it might be likely to return is stopped and the body laid in natrum the prescribed number of days. At the end of the time the cedar oil is allowed to make its escape, and such is its power that it brings with it the whole stomach and intestines in a liquid state. The natrum meanwhile has dissolved the flesh and so nothing is left of the dead body but the skin and the bones. It is returned in this condition to the relatives without any further trouble being bestowed upon it.

"88. The third method of embalming, which is practised in the case of the poorer classes, is to clear out the intestines with a clyster and let the body lie in natrum the seventy days, after which it is at once given to those who come to fetch it away."

Examples of the first method of embalming are afforded by the mummies of the Egyptian Pharaohs, Rameses II. and Rameses III., which, being now unwrapped, present the features so clearly as to give a good idea of the king's appearance during life.[1]

The second method was used in the case of Heni, an Egyptian official of 2100 B.C., in the 11th dynasty, preserved in the British Museum, catalogue No. 23425. The bones are well articulated with the ligaments undestroyed, and the mummy has been further treated with bitumen.

On the nature of the substance described as natrum there is considerable difference of opinion. The word used by Herodotus (ταριχεύω = I pickle fish) suggests the employment of brine made from chloride of sodium, and the recent analysis of some mummy wrappings supports this view. Other bodies appear to have been steeped in bicarbonate of soda, and by this process a kind of adipocere was no doubt formed by the soda and the flesh. During this rough method of steeping in alkaline solution for seventy days the bodies must often have decayed considerably, and parts of the body may have required to be replaced. Dr. Wood Jones showed me a forearm and hand that had been nicely manufactured from linen wads supported by a fibula in the centre! No doubt the priests or physicians, in the case of important mummies of kings or grandees, injected some strong and aromatic antiseptic,

[1] The first method is stated by Diodorus to have cost a talent of silver (£225), the second twenty minæ (or about £75).

upon the nature of which they did not choose to enlighten Herodotus, and which has completely evaporated in the course of ages. In the case of finer mummies, too, the skin appears often to have been treated with wax. The statement of Herodotus, that in some cases the bodies were not handed over to the embalmers for some days after death, is substantiated by a piece of bitumen, which Dr. Wood Jones showed me, taken from the pleural cavity of a girl's mummied body. In this mass were embedded numerous beetles and maggots, indicating the delay that had taken place before the commencement of the process.

For the incision in the side a knife of flint or Ethiopian agate had to be used in accordance with the ceremony which had come down from the Stone Age of prehistoric times. After withdrawal of the organs, and presumably after inspection by the physician, these were placed in four Canopic jars. Each of these jars had a lid shaped in the form of one of the four children of Horus who watched over the contained organ. Thus Hāpi, who represented the north, guarded the smaller viscera; Tuamutef, who personified the east, superintended the heart and lungs; Amset, who typified the south, took charge of the stomach and intestines; while Qebhsennuf, who stood for the west, was responsible for live. and gall bladder.[1]

After an elaborate funeral ceremony, in which the *Book of the Dead*, containing the ritual appropriate to each action, was recited, these Canopic jars were placed in the tomb, together with the finished mummy in its case, and such food, drink and furniture as might be requisite to cheer the shade of the departed person.

The ceremonial that accompanied an Egyptian funeral was of a most elaborate type, and was set forth in a complicated ritual, of which the origin is lost in remote antiquity. The details of this ritual we know from various versions of the *Book of the Dead*, of which different chapters were derived from various ages, and even from predynastic times. Portions of this ritual were entombed with the mummy, either written on papyrus, or painted on the coffin, to be a guide and protection to him in the nether world. The most complete version or recension of this book was that used at Thebes, and of this version the finest copy was found in the coffin of Ani, a scribe of 1500 B.C., and is now preserved in the British museum.

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[1] For further information, see *History of Egyptian Mummies*, by T. J. Pittigrew, London, 1834; also *Manners and Customs of the Ancient Egyptians*, by Wilkinson, New Edition by S. Birch, London, 1878; also *The Mummy*, by E. A. Wallis Budge.

The Egyptians regarded man's nature as formed of three components. There was the body, with its conscience, intelligence, and other attributes. Secondly, the soul, which was freed by death and dwelt in heaven, and thirdly, the Ka, which can best be translated as shade or ghost. It lived either in the tomb or haunted the abodes of the body during life, was apparently of a benevolent disposition, but possessed sufficient corporeal existence to play a game of draughts with visitors to its tomb.

The god of health was Horus, god of the forenoon and noonday sun, identified in later times with the son of Isis and Osiris. He was acknowledged by the Greeks as the prototype of their Apollo.

The religion of the Egyptians was a curious mixture of sublime spiritual truths and childish superstitions. This is reflected, to a great extent, in their medical beliefs and practices, to an understanding of which we are helped by an appreciation of their religion. I have seen nowhere a better statement of this matter than that given by Dr. Budge,[1] which I may quote:—"When we consider the lofty spiritual character of the greater part of the Egyptian religion, and remember its great antiquity, it is hard to understand why the Egyptians carefully preserved in their writings and ceremonies so much which savoured of gross and childish superstition, and which must have been the product of their predynastic or prehistoric ancestors, even during the period of their greatest intellectual enlightenment. But the fact remains that they did believe in one God who was almighty and eternal and invisible, who created the heavens, and the earth and all the beings and things therein; and in the resurrection of the body in a changed and glorified form, which would live to all eternity in the company of the spirits and souls of the righteous in a kingdom ruled by a being who was of divine origin, but who had lived upon the earth and had suffered a cruel death at the hands of His enemies, and had risen from the dead, and had become the God and King of the world which is beyond the grave; and that although they believed all these things and proclaimed their belief with almost passionate earnestness, they seem never to have freed themselves from a hankering after amulets and talismans, and magical names and words of power, and seem to have trusted in these to save their souls and bodies, both living and dead, with something of the same confidence which they placed in the death and resurrection of Osiris."

One of the commonest amulets used, and its employment seems to have been universal from the earliest to the latest period of Egyptian history, was the Utchat or Eye of Horus. It was made of various materials and was supposed when worn to confer upon its wearer the strength of the noonday sun, and to secure him in his health. It was also placed upon writings and objects of various sorts, to secure success. When alchemy or chemistry, which had its cradle in Egypt, and derived its name from Khami, an old title for this country, passed to the hands of the Greeks, and later of the Arabs, this sign passed with it. It was also adopted to some extent by the Gnostics of the early Christian church in Egypt. In a cursive form it is found in mediæval translations of the works of Ptolemy the astrologer,[1] as the sign of the planet Jupiter. As such it was placed upon horoscopes and upon formulæ containing drugs made for administration to the body, so that the harmful properties of these drugs might be removed under the influence of the lucky planet. At present, in a slightly modified form, it still figures at the top of prescriptions written daily in Great Britain (℞).

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[1] *Egyptian Magic*, by E. A. Wallis Budge, M.A., D.Litt., 1901, preface.

PAPYRUS EBERS.

The most important extant medical papyrus is that discovered by Ebers during a stay in Egypt in 1872. It is dated by him from a period 1553-1550 B.C., and was supposed by him to represent one of the lost Hermetic Books. This is not now believed to be the case; but it is regarded as a compilation made at the date mentioned of remedies which had been in use from a much earlier period.

"The question here at once arises[2] as to whether our papyrus be an original production. Lepsius, and with him, indeed, most of the Egyptologists, declare it to be merely a copy. We shall not now inquire further into the reasons that the learned investigator has alleged for his opinion. That we have, in fact, however, before us, in this manuscript, only a copy, the papyrus itself gives positive proofs. In some places, namely, page 18, line 1; page 89, line 1; and page 90, line 3, we find written in with red ink in the middle of the text the words qem-sen = 'found destroyed.' What would this phrase do in an original work? Further, we find a few passages repeated with only slight variations; compare the following:—Page 37, line 10, to page 38, line 3, and page 38, line 10, to page 39, line 2; page 25, lines 3 to 8, and page 52, lines 1 to 7. There are, besides, to be found not infrequently the same prescriptions repeated in different places and for different illnesses.

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[1] *Ptolemæi de Praedictio Astronomi Tetrabiblos*, 1535.

[2] In this description, and throughout the prescriptions, the German translation of the papyrus has been used—*Papyros Ebers, das älteste Buch über Heilkunde, aus dem Aegyptischen zum erstenmal vollständig übersetzt*, von Dr. Med. H. Joachim, Berlin, 1890.

"The manner and way in which this manuscript has originated can be best explained, as by Ebers, 'that the sacred scribe had in copying to combine different smaller writings into one, and, without thinking of the sense, had copied several pieces of the same meaning,' and, we may add, drew attention to occasional gaps in these writings by the above-mentioned 'qem-sen.'

"The papyrus has undoubtedly been used; slight inaccuracies in the text have been corrected, consequent, I believe, on its use—sometimes, indeed, with paler ink than that in which the papyrus is written, as one can clearly make out. On the margin of the pages there are now and then short remarks; for instance—probably by a later user—on the margin of page 40 the word nefr = 'good' has been added three times in pale ink, different from the original; on page 41 there are on the margin the words nefr ar = 'good to prepare.'"

. . . .

The account of the purchase and discovery of this MS. is given by Ebers in the introduction to the facsimile of the papyrus.[1] He says that in the winter of 1872-73, while in Thebes, he was offered this papyrus by a resident there. He was informed that it had been obtained fourteen years before from a grave at El Assassif, near Thebes, and had been found between the legs of a mummy. The original finder of the papyrus was dead, so that the exact grave could not be ascertained. The calendar written on the back of the papyrus impressed Ebers with its chronological importance, which, together with the beauty of the writing, led him to purchase it.

As the Egyptians supposed that some diseases were curable by medicines, while others were amenable only to incantations and prayers, the remedies form a curious medley of active drugs, amulets, and invocations. Many of the prescriptions commend themselves quite well to modern practice, others comprise a mixture of heterogeneous and irrelevant substances, some are disgusting. Still, at their crudest, these prescriptions are no worse than those contained in the pharmacopœias of the Colleges of Physicians of Edinburgh and London as late as the end of the seventeenth century A.D. The papyrus also gives some insight into the physiology of the day, surgical practice, and even tells what the doctors were to say to their patients.

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[1] *Papyros Ebers, das hermetische Buch über die Arzeneimittel der alten Aegypter in hieratischer Schrift,* Leipzig, 1875.

As an example of an incantation, we may take the words to be spoken when remedies were being prepared.

I. "May Isis heal me as she healed her son Horus of all the pains which his brother Set brought on him when he slew his father Osiris. Oh Isis! Thou great enchantress heal me, save me from all evil things of darkness, from the epidemic and deadly diseases and infections of all sorts that spring upon me, as thou hast saved and freed thy son Horus, for I have passed through fire and am come out of the water. May I not light upon that day when I shall say 'I am of no account and pitiable.' Oh Ra, who hast spoken for thy body. Oh Osiris, who prayest for thy manifestation. Ra speaks for the body, Osiris prays for the manifestation. Free me from all possible evil, hurtful things of darkness, from epidemic and deadly fevers of every kind."

Or, take again the words to be said for a burn—

LXIX. "Oh Horus! thou son of God. There is fire in the land. Whether there be water or not there is water in thy mouth, the Nile is in thy feet if thou come to quench the fire." This invocation was to accompany a local application of milk and wool to the burnt part.

With regard to drugs, the Ebers Papyrus and other medical papyri mention the following well-known substances:—Sulphate, oxide, and other salts of lead used as astringents and demulcents; pomegranate and acanthus pith as vermifuges; sulphate and acetate of copper; magnesia, lime, soda, iron and nitre; oxide of antimony, sulphide of mercury; peppermint, fennel, absinth, thyme, cassia, coriander, carraway, juniper, cedar wood oil, turpentine and many other essential oils; gentian and other bitters; mandrake, hyoscyamus, opium with other hypnotics and anodynes; linseed, castor oil, squills, colchicum, mustard, onion, nasturtium, tamarisk, frankincense, myrrh, yeast. Besides these are many drugs, especially essential oils, which probably were valuable remedies, but of which the names, being highly technical, are impossible, so far, to translate.

Among external applications were—the knife, the actual cautery, massage, ointments, plasters, poultices, suppositories, enemata, inhalations, and the vaginal douche and fumigation.

The active means to be used against the results of a burn were as follows:—

LXVII. *First Day.*—Place upon it black āmāt juice.

Second Day.—Place upon it burnt and powdered goat's excrement mixed with active yeast.

Third Day.—Place upon it a plaster made of acanthus thorns dried, ground and mixed in oil, with boiled durra and onion.

Fourth Day.—Place upon it a plaster made of wax, roasted tallow, palm fibre and uāh grains.

Fifth Day.—Place upon it a plaster made of onions, red oxide of lead, and fruit of the am-tree, ground and mixed with copper dust. After this it was to be bandaged up with a poultice made of boiled uāh grains.

The following is a remedy to cause the hair to grow, prepared for Ses the mother of the late Pharaoh of Upper and Lower Egypt:—

Toes of a dog	1 part.
Ripe dates	,,
Asses hoof	,,

Boil carefully in a pan of oil and use to rub in.

Of another prescription for baldness appearing in patches it must have been somewhat difficult and dangerous to obtain the ingredients, though the pomade is certainly impressive.

LXVI.	Lion's fat	1 part
	Hippopotamus fat	,,
	Crocodile fat	,,
	Goose fat	,,
	Snake's fat	,,
	Nubian ibex fat	,,

to be mixed and rubbed into the scalp of the bald one.

Still another prescription for baldness which savours of homeopathy is:—

Writing ink
Cerebro-spinal fluid

to be mixed in equal parts and applied to the head.

The following gives the method for making an inhalation:—

LV.	Animi solatium grains	1 part
	Meni-resin ,,	,,
	Aām plant ,,	,,

Rub down together; take seven stones, heat them in the fire, place upon one of them some of the above. Cover it over with a new vessel in which a hole is bored. Place a reed in the hole and set the mouth to the reed so as to inhale the vapour. Similarly with the remaining six stones; afterwards eat something fat, either of fat, flesh, or oil.

To remove granules from the eye.

LVII.	Collyrium	1 part
	Subacetate of copper	,,
	Onion	,,
	Wood dust	,,
	Sulphate of copper	,,

Stir up in water and apply to the eyes at the back.

Note.—I may further say here, that in addition to using the modern bluestone treatment for trachoma or Egyptian ophthalmia, the Egyptians of 1500 B.C. possessed forceps with flat, broad blades, which were used apparently for removing an inward growing eyelash, and were admirably adapted for crushing the granules. Professor Sayce has shown me an excellently preserved pair of copper forceps of this period in his collection.

One eyewash or salve is given on the authority of a Semite from Byblos (Gebal in Phœnicia) who was probably a great authority upon eye diseases in his time. His eyewash is mentioned in much the same way that one might recommend to-day some prescription of a noted specialist in Wiesbaden or Vienna.

To prevent trichiasis from doing harm to the ball of the eye, the following characteristic directions are given:—

LXIII. Pull out the hair and apply—

Myrrh	1 part
Lizard's blood	,,
Bat's blood	,,

For dacryo-cystitis, the writer of the Ebers Papyrus gives the following, with the remark, "Note well, for this is the real thing."

Collyrium	1 part
Wood dust	,,
Dry myrrh	,,
Honey	,,

Anoint the eye four days with this.

For a suppurating wound, the following early example of antiseptic treatment is recommended:—

LXVIII.	Qebu oil	1 part
	Crocus	,,
	Expressed cedar oil	,,
	Sefet oil	,,

Grind together and apply as a plaster.

To draw out pus the following is recommended:—

LXXVI.	Date meal roasted	1 part
	Meal of wheaten chaff	,,
	Bicarbonate of soda	,,
	Endivia seeds	,,

Warm, and apply as a plaster.

One notes many curious and sometimes repulsive substances in these prescriptions, but it would be unjust to conclude that they were indifferently used for the diseases in connection with which we find them named. In the first place, there are various recipes quoted for each disease, and the compiler of the papyrus apparently included everything of which he had heard as likely to benefit each disease. Again, if we consider a time not far removed from our own we find that the Pharmacopœia of the Royal College of Physicians of London for 1651 A.D. prescribes—to select a few examples:—Hare's brain; swallow's nest; horn of the stag, the rhinoceros, and the unicorn; powder of Egyptian mummy; blood of the cat, pig, bull and tortoise; excrement of doves, goats, stallions, cows and men; bile of pigs, hawks, bulls and bears; urine of goats, boars and boys; stone from the human bladder; and dead man's fat and skull. He, therefore, who insists that experienced and liberal-minded men of this profession in ancient Egypt were entirely bound to foolish spells and fanciful conglomerations may be compared to someone of a future race digging three thousand years hence among the ruins of London, and who, finding a copy of this Pharmacopœia, should forthwith contemptuously dismiss from mind the possible existence of Sydenham or Harvey.

We gain from the Ebers Papyrus some interesting sidelights upon the views regarding the physiology of the blood-vessels, and in this we see at once a marked contrast between the elementary scientific knowledge of the Egyptians and the highly developed and useful empiric practice that I have tried to indicate.

One passage in the papyrus purporting to be written for the Pharaoh Usaphäis of the First Dynasty (3400 B.C.) gives some account of the heart and vessels, and makes a vague suggestion of the passage of the blood through them.

Another section of the same papyrus gives a description of the action and importance of the heart itself.

XCIX. "From the heart come the vessels to the whole of the body. Any physician . . . may feel these if he puts his finger upon the head, or the back of the head, or the nose, or the region of the stomach, or either arm or the legs. Everywhere the action of the heart meets him, for its vessels run to all the limbs. Therefore is it named the centre, over the vessels of all the limbs. Four vessels run in the nasal cavities, of which two bring mucus and two blood. There are four vessels in the interior of the temples from which the eyes obtain their blood. . . . There are four vessels which distribute themselves in the head. . . . There are four vessels to the ears, two on the right side and two on the left side. The vital spirit goes in at the right ear, and the breath of death into the left ear. . . . Three vessels (*i.e.* artery and two veins) lead to each arm and to the fingers, and three vessels lead to each leg which reach down to the soles of the feet. . . . Two vessels lead to the kidneys, one to each, four vessels lead to the liver which bring it moisture and air. Here originate all sorts of diseases, for they are mixed with the blood. Four vessels go to the intestines and the spleen, which also bring them moisture and air. Two vessels go to the bladder, which produce the urine. Four vessels proceed to the great intestine, and conduct moisture and air."

Next follows a great deal of theory as to the manner in which diseases originate from the action of the heart, and the advice, which really sums up the whole of cardiac therapeutics, that when the heart is diseased one must obtain for it rest as much as possible.

The reference to the vital spirit and the spirit or breath of death is interesting, and suggests the superstition regarding the luckiness of the right side of the body, and the sinister attributes of the left.

We may note in passing that the Egyptians regarded the heart as the fountain of all the moral qualities and the seat of conscience. From them, no doubt, our modern metaphors of "clean hearted," "large hearted," &c., are derived indirectly through the Hebrew scriptures. The brain, on the contrary, was considered merely as so much pulp, to be scraped out and cast away when the body was embalmed.

As to pathology, the difficulty of translating technical names, together with the totally different outlook upon disease taken by the Egyptian physicians and ourselves, renders it extremely hard or impossible for us to grasp more than a vague idea of the diseases which these old physicians mean to indicate.

Several forms of intestinal parasite with their appropriate vermifuges are clearly indicated; a pernicious type of bloodlessness seems to have greatly exercised their curative endeavours, and an infective disease called "uchedu," which is difficult to identify, is very frequently mentioned. At a later date, the discoveries of Professor Elliot Smith and Dr. Wood Jones have shown that malignant disease, leprosy, infantile paralysis, inflammatory diseases of bone, gout, and, above all, rheumatoid arthritis, were common maladies as they are now. The question of syphilis has been raised in connection with the advanced atheroma that has been found in the large arteries, the diffuse signs of periostitis, and particularly in regard to a case of ulceration of the skull described recently by Professor Lortet.[1] No absolutely conclusive evidence as to the existence of this disease in early Egypt has, however, yet been found; and Professor Elliot Smith has demonstrated that the supposed ulceration is probably due to the attack of insects ages after the bones were buried.[2] There has even been discovered a mummy showing old-standing fibrous adhesions in the pelvis consequent on appendicitis!

With regard to surgery, the statement has been made in almost every text-book on the history of medicine that the Egyptians practised the amputation of limbs. I have not been able to find any basis for this statement, and Professor Sayce tells me that the very idea of the mutilation of the body was so foreign to their religious ideas, that this practice would have been impossible. The original of the statement regarding amputations appears to have been made by Larrey, when he accompanied Napoleon's army of invasion into Egypt, and visited the pyramids and temples of this country. He described pictures on the walls showing these surgical procedures, of which apparently he had mistaken the meaning.[3]

Another statement which is commonly made is, that the Egyptians were the first to stop decayed teeth with gold. This may be the case; but after considerable search and enquiry, I have been unable to obtain any confirmation of the statement.

Obstetric practice, as we learn from Exodus i., was in the hands of midwives. Four of these, a chief midwife with three assistants, were generally present at the delivery of the patient, who sat upon a special stool.[4]

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[1] Lortet et Gaillard, *Archives du Muséum d'Hist. Naturelle de Lyon*, 1907.

[2] Elliot Smith, *Lancet*, 1908, vol. ii. p. 521.

[3] Larrey, *Relation Historique et Chirurgicale de l'Expédition de l'Armée d'Orient*, Paris, 1805.

[4] See, further, "Birth Stools in Egypt," by Sir A. R. Simpson, *Edinburgh Medical Journal*, September 1908; also Spiegelberg, *Ægypt. Randglossen zum Alt. Test.*, 1904, pp. 19-25.

Caton[1] quotes Dr. Grant Bey as asserting that the operation for cataract was practised in ancient Egypt. This is interesting, in support of the contention that cataract was operated upon in Babylonia 2000 years B.C.

Although the Egyptians would not, in all probability, amputate limbs, except in so far as the mere severing of a hopelessly shattered member might be concerned, we know from the Ebers papyrus that they both possessed great skill in the diagnosis of tumours, and removed them by knife and cautery.

The following is the treatment of what seems to be either a collection of tuberculous glands in the neck, or an abscess there:—

CVI. "When thou meetest a fat swelling (that is tumor scrofulosus?) in the neck, and findest it like an abscess of the flesh, then say, 'I will treat the disease with the knife, while I carefully avoid the vessels.' Make them a plaster as a means of healing from the swelling.

"When thou meetest a tumour which has attacked a muscle . . . when thy finger examines it and it is like a hard stone under thy fingers (carcinoma?) . . . say, 'I will treat the tumour with the knife.' Cover it with fat and treat it as one treats a suppurating wound in any part of the body."

The following is a clear description of the diagnosis of a fatty tumour which any one may recognise, and of its treatment. CVII. "When thou meetest a fat tumour in any part of a person, and findest that it goes and comes under thy fingers, and also quivers when thy hand is still, say then of it, 'It is a fatty tumour, I will treat the disease.' Treat thou it with the knife and heal it as one heals an open wound."

The following is the method of treating a vascular tumour that bleeds. "If thou meetest a tumour of the muscles in any part of a person's body and findest it of rounded shape grown up under thy fingers and spread out upon his flesh; if it is not large and does not project greatly, say thou of it, 'It is a tumour of the muscle, I will heal the disease. The muscles produce it. . . .' Treat thou it with the knife and burn it out with fire, that it may not bleed. Heal thou it with the glowing metal."

These are sufficient extracts to show that the physicians of this time possessed considerable power in differentiating tumours, and did not fear boldly to remove them.

In the treatment of fractures the medical practitioners of the New Empire seem to have possessed a considerable degree of skill.[1] They did not indeed rise to the level of Hippocrates who, in Greece 400 years B.C.,[2] states that a mended fracture of the thigh in which shortening has taken place is a great disgrace and an injury. But they were able by means of palm fibre splints and linen bands even so early as the time of the Fifth Dynasty, to unite broken femora and tibiæ so that no rotation and no tilting of the lower fragment resulted.[3] Fractures of the forearm they seem also to have mended skilfully, but fractures of the clavicle appear to have been left to the *vis medicatrix naturæ* with sad results on the shapeliness of the shoulder.[4]

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[1] Caton, *The Harveian Oration for* 1904.

OTHER PAPYRI.

Of the other papyri I need not say much. The Berlin Medical Papyrus is supposed to have been part of a large library at Memphis, which is mentioned by Galen as having contained medical books. He speaks of a panacea used by the Egyptians of which the formula is to be found in one of these. This library was probably kept by the priests of Im-hotep. The papyrus belonged to the Nineteenth or Twentieth Dynasty. It is not apparently of so much real value, nor is it so large as the papyrus of Ebers.

Kahun Medical Papyrus, found at Kahun in April 1899, dates from before the reign of Amenemhat III. It is 39½ inches in length and consists of three pages which had been mended and strengthened by its ancient possessor with strips torn from other papyri and pasted on the back. Its text consists entirely of gynecological instructions and prescriptions without title or introduction. In the first two pages were 17 prescriptions all of one form. "Treatment for a woman suffering from," etc. (symptoms); "Say thou with regard to it—'It is,'" etc. (diagnosis); "Make thou for it" (prescription).

The substances prescribed are generally reasonable and obvious, such as beer, cow's milk, oil, dates and other fruits, herbs, incense, etc. Sometimes they are of an offensive character. The quantities are large: the henu ($\frac{6}{7}$ths pint) for liquids, and the cubic quarter ($\frac{1}{64}$) hekt, or 4½ cubic inches for solids.

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[1] I desire here to express my gratitude to Professor G. Elliot Smith and Dr. Wood Jones for much valuable information regarding ancient Egyptian pathology and surgery, and especially for their kindness in allowing me to make lantern slides of their material to illustrate this lecture.

[2] Hippocrates: on Fractures, sec. 19.

[3] *The Most Ancient Splints*, by G. Elliot Smith, M.D., F.R.S., *British Medical Journal*, 28th March 1908.

[4] See *The Archæological Survey of Nubia Bulletins*, 1908.

In the first two pages some of the diseases, as hysteria and influenzal seizure, are easily recognisable, and the treatment seems appropriate enough. The third page, which seems to belong to another period or to be derived from some different source, contains mostly quack prescriptions, such as directions for deciding whether an unborn child is male or female.

What I have said will suffice to show that the assistance of a class trained in the art of healing was eagerly sought in the lands where the dawn of our civilisation began. If we remember that the time of which I have spoken was a period of slow transition from an age of bronze to one of iron, we see that this art occupied a position of high efficiency as compared with other crafts, and of great advancement in the general scheme of human knowledge. Those who devoted their energies to medicine exercised the art with a fair measure of success, and in proportion to their labours, were held in honour by those whom they had served.

Ancient Hindu Medicine

JOHN D. COMRIE

M.A., B.Sc., M.D., F.R.C.P.E.

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John D. Comrie, M.A., B.Sc., M.D., F.R.C.P.E.

(Address delivered to the Edinburgh Branch of the Indian Guild of Science and Technology).

IN lecturing to you upon Ancient Hindu Medicine, I wish it to be distinctly understood that I approach the subject not as one having an expert knowledge with practical experience thereof, for many of you have doubtless a much more personal acquaintance with the modern representatives of this ancient medicine than I have ever had. But I come to it with a certain amount of critical ability derived from the study of other old medical systems, especially that of the Greeks, and I trust that this will enable me to make a just appreciation of the Indian Medicine and its practitioners, although I am ignorant of the language in which their ancient works were written.

In approaching Ancient Indian Medicine we have to recognise four distinct periods or phases; and it is with the second of these that I shall chiefly deal. These are:—

1. The Vedic, extending from the time when the Hindus first migrated into the Punjab, down to 800 B.C. or so.
2. The Brahmanistic period, when it was dominated by the priestly caste and obtained its characteristic features.
3. The Arabic period after 1000 A.D. in which many new features were added from Western Medicine, but which was a period of decline so far as Hindu Medicine is concerned.
4. The modern period of British influence.

1. THE VEDIC MEDICINE.

The Rig Veda and Atharva Veda, the sacred writings of the Hindus, which date probably from between 1500 and 1000 B.C., contain a great deal of medical lore, but the treatment of disease is to a very great extent of a theurgic nature. In this it agrees with all other primitive medical systems, for example that of the ancient Babylonians and Assyrians. In the earlier of these sacred writings, prayer and invocation to the gods are the chief remedies against disease which is regarded as the effect of evil-doing, while in the latter are found magic and spells to be directed either against the demon of disease or against witchcraft of other men. There were definite deities who especially cultivated medicine, thus Indra was supposed to have instructed certain sages in the medical principles of the *Ayur Veda*, which had been composed by Brahma himself as the first work devoted to the principles of healing It consisted of one hundred sections of one hundred stanzas each. The Asvins, the twin heralds of the dawn, were also medical deities, of whom there are many legends regarding their successful treatment both of the other gods and men. The same tendency to associate medicine, and more broadly speaking, the preservation of health with the youthful sun-god is noticeable in other primitive peoples, thus Horus was the patron of medicine to the Egyptians, Appollo and his son Asklepios to the Greeks.

The comprehensive nature of the *Ayur Veda* is gathered from the subjects dealt with by the eight sections into which it is divided. These were: (1) On the surgery of removing foreign bodies, apply bandages, etc. (2) Diseases of parts about the head and neck. (3) General diseases like fevers and diabetes. (4) Demonical diseases and the means of restoration from them by prayers, offerings, medicines, etc. (5) Management of children. (6) Antidotes for poisons. (7) Medicines to preserve vigour, restore youth, prevent disease, etc. (8) Aphrodisiacs. For this reason medicine is often called by Indian writers the octopartile science.

It is interesting to note that attempts were made to transfer certain diseases by magic from men to animals, e.g., cold fever to frogs, and jaundice to parrots; also that homeopathic remedies were in use, so that yellow plants were recommended in jaundice and poisoned arrows against poison. Use was made of medicinal herbs, as well as charms, in the treatment of surgical cases; and the Vedas were familiar with extraction of arrows, dressing of wounds, artificial limbs, castration, etc., while distinction was made between a number of diseases, such as scrofula, vertigo, dropsy, epilepsy, gout, heart disease, jaundice, hemiplegia, etc.

The social conditions of the Vedic period, like those prevailing among the Homeric Greeks, were apparently primitive but happy, and in a sense cultured. Thus the patriarch studied carefully the art of war and went to battle clad in armour; elephants were trained and horses gorgeously decked out; there were numerous kinds of artisans like weavers, sculptors, and carpenters; and women held a high social position. Amidst this society the profession of the healer flourished and medicine was practised for the sake of gain, as is indicated by the saying "The wishes of men vary: the waggoner desires wood, the doctor sickness, the priest libations"; while a physician mentioned in the Rig Veda hopes to get by his cures "horse, cattle and clothes." There was thus a primitive Hindu medicine like that of other primitive peoples, practised by a class separate from the priests though working mainly by theurgic means from sacred tradition, and apparently held in considerable repute. It may be added that this medicine was apparently far in advance of the Assyrian and Egyptian or even Greek medicine of the same period (800 B.C.).

It is, however, when we come to the Hindu middle ages that we find a medicine developed with characters of its own, practised by a highly esteemed class of men, and provided with a copious literature. In dealing with this epoch I shall speak of:—

1. The Hindu practitioners and writers.
2. Relation to the medicine of Greece.
3. The Indian Materia Medica and methods of medical treatment.
4. The theoretic basis of Indian Medicine.
5. Indian Surgery.

HINDU PRACTITIONERS AND WRITERS.

Medicine at first lay in the hands of the Brahmans, though its everyday practice must have been considerably hampered by their ceremonial restrictions. It found its way at a very early period, therefore, into the hands of the high mixed caste of the Ambastha (Vaidya) with whom were associated as assistants to do the more menial and ceremonially unclean tasks the caste of the Vaisya.

The great centre of medical science and teaching in these early times lay in the holy city of Benares, which was also the seat of Brahmanic learning. The choice of the medical profession was conditional upon good descent, preferably from a medical family, but apparently it was open, along with other similar literary callings, to members of various higher castes. The mode of life and pursuit of study were most minutely regulated, but among a people with whom tradition and caste count for so much it was unnecessary to have any state regulation of the conditions upon which a prospective physician entered his profession. I cannot at all events discover that there were any laws controlling the examination of students or the behaviour of practitioners beyond the stringent caste and family rules and religious restrictions. The same may be said of the practitioners of the same period in Europe where at the beginning of the Christian era medicine was a business pursued by certain families, and taught at certain good medical schools, but tramelled by no outside restrictions or state interference whatsoever.

The system pursued was apparently by a kind of apprenticeship of pupils to a well-known physician, who instructed not more than four to six students at one time. Tuition lasted six years, and consisted partly in learning by heart precepts communicated by the teacher, partly in practical instruction at the bedside and in surgery anatomy of a sort. Reverence was inculcated towards Brahmans, teachers, and the poor who were to be treated free of charge; while the physician was enjoined to exclude from the benefits of treatment hunters, fowlers, caste-breakers, criminals, and what is interesting, as indicating a shrewd eye to the main chance, incurables and those in disfavour with the King.

Several aphorisms of this period are commonly quoted as showing the aims and position of the physician:—

"He who is trained only in theory but is not experienced in practice knows not what to do when he has a patient, and behaves as foolishly as a youth upon the field of battle; while a physician who is educated practically but not in theory will not earn the respect of better men.

"Medicine and surgery must both be mastered, for the physician who lacks a knowledge of one of these branches is like a bird with only one wing.

"In illness the physician is a father, in convalescence a friend, when health is restored he is a guardian."

The following is the description of a student likely to be suited to the study of medicine:—"The scholar must have a quick tongue, small lips, regular teeth, a noble aspect, well-formed nose and ears, a lively spirit, and a graceful bearing; he must be capable of withstanding pain and fatigue." The admission of the pupil to the study of medicine was a religious ceremony, conducted in the presence of Brahmans, and at its close he was warned to be chaste and abstemious, to wear a beard, to speak the truth, to eat no meat, and to render obedience in all things to his teacher.

The practice of surgical operations was taught in a somewhat superficial manner, but as we shall see later the pupil would doubtless have opportunities during his six years' apprenticeship of observing some good operative surgery, for this was one of the striking features of early Indian Medicine. At first he was shown incisions upon fruits; punctures in distended skins; bladders, or bags; scarifications upon stretched skins; venesection upon dead animals or the stalks of lotus plants: tooth extraction upon dead animals: probing in worm-eaten wood: opening of abscesses in a lump of wax; stitching in clothes: cauterising on meat, etc.

With regard to the tuition in practical anatomy, which is the "sine quâ non" of sound surgery, an important question arises. The high-caste physician was, of course, prevented from habitual practice of dissection by the ceremonial rules which forbade all contact with dead bodies. But we have it on the high authority of Hoernle (Studies in the Medicine of Ancient India. Pt. 1, 1907) that there is direct proof from the Medical Compendium of Susruta (the earliest Indian medical writer) indirectly confirmed by statements of Charaka that the practice of human dissection existed. Whether or not these cases of dissection were frequent we do not know, but at all events the early Indian physicians seem to have made a great speciality in their study of the bones of the human body. Their theories as to the human osteology and the divisions and relations of other structures of the body in relation to the bones have come down in numberless compendia, of which the earliest were those of Atreya, Susruta, and Vaghbata.

Susruta (Hoernle, p. 70) in the following passage makes out that there are 300 bones:—

"The professors of general medicine speak of 360 bones but books on surgical science know only of 300. Of these there are 120 in the extremities, 117 in the pelvic cavity, sides, back, abdomen and breast, and from the neck upwards there are 63. In this wise the total of 300 bones is made up." (N.B.—This number includes the 32 teeth.)

An earlier version by Atreya, published by Charaka, made the total of 360.

In some of the later recensions of these writers—and the number of MSS is legion—the bones are multipled and reclassified in the most arbitrary and imaginary manner without any reference to actual fact. This is a singular and characteristic feature of later Indian medicine, that whereas verification would have been so easy by an appeal to the book of nature, all the writers preferred to draw upon a corrupt authority and upon their own imagination for their facts. It reminds us of the same condition of affairs in the Western Medicine of the middle ages, but while in the West a return to study of nature has been made from the 16th century onwards, in native Indian anatomy that new birth has never taken place, at all events not until it was re-animated from the Medical Schools established in modern times by the British.

With regard to the chronology of the ancient Indian medical writers, a considerable amount of doubt exists. *Atreya*, the physician, who really flourished in all probability some time in the 6th century, B.C., is said by one tradition to have received his medical training from Bharadvaga or from Dhanvantari, Sages, who had learned the science from Indra himself; and by another tradition to have been the leading Professor of Medicine in one of the two great Universities which existed during the life of Budda at Benares and Taxila. *Susruta*, the great surgeon of early Indian Medicine, probably lived in the 5th century, B.C., at Benares, and was thus a contemporary of Hippocrates, the greatest of the founders of Greek medicine. Indian surgery thus took its origin in the East of the land, and ophthalmic surgery which is an important branch of Indian medicine is uniformly credited by tradition as having originated in the Eastern province of Bihar. It is probable, however, that ophthalmic surgery owes something to the Persians for the couching of cataract was practised in that country from the very earliest times, and mentioned in the Code of Hammudabi (2000, B.C.). *Charaka*, whose name is celebrated as the great physician of early Indian medicine, just as Susruta is its surgeon, is said by a Buddhist tradition to have been physician to the renowned King Kanishka; at all events his date is generally placed either in the 1st or early in the 2nd century of the Christian era. *Vagbhata*. who with Susruta and Charaka, form the great triad of Indian medical authority, much as Hippocrates, Celsus and Galen stand to Western medicine, has a considerably later date. He is stated by a Buddhist pilgrim, Itsing, to have epitomised the eight medical sciences into one book about Itsing's time. This was early in the 7th century, A.D., which is generally accepted as Vagbhata's epoch. *Harita*, *Madhava*, *Dridhabala*, and *Vagbhata II.* lived and wrote between the 7th and 11th centuries, A.D.

The number of medical writers and MSS has been extraordinarily large, and according to Liétard, the writings of not less than two hundred and thirty authors have come down to us. Of these most are simply recensions from the works of older writers with additions, recapitulations and re-arrangements that in the newer writers are not always for the better. Both Eastern and Western scholars have laboured upon the disentanglement of the dates and critical appreciation of these manuscripts. Witness for example the Studies in the Medicine of Ancient India, by Hoernle. The oldest medical manuscript still preserved is probably the Bower MS, which consists of 56 leaves, mostly covered on both sides with writing in Sanskrit characters. It is formed from birch bark, is in excellent preservation, and dates from the 5th century of our era, having been discovered in a Buddhist tomb in Chinese Turkestan during 1889, and purchased by Lieut. Bower. It was transliterated, translated, and published with facsimilies of the pages for the Indian Government by Hoernle in 1894.

2. RELATION TO THE MEDICINE OF GREECE.

We have seen that the father of Western medicine, Hippocrates, and the most noted of the ancient Hindu surgeons, Susruta, flourished within the compass of the 5th century, B.C. It has often been questioned what influence the two systems exercised upon one another and what debt, if any, either owes to the other. There is no doubt that much commercial intercourse went on between Magna Graecia and India by way of Persia, even before the invasion of Alexander in 327, B.C. A Greek historian (Hecatæus, of Miletus) speaks of India, two centuries before this date; Herodotus (450, B.C.) also speaks of its Western part; and Ctesias (401, B.C.), who lived for some time at the Persian Court, whither many other Greeks found their way, brought back many facts about Indian peoples and customs, fabrics and strange animals. The knowledge of India was widely diffused after Alexander's expedition, which was accompanied by a host of learned men and physicians. The latter could not fail to learn something from the Indian colleagues whom, as Arrian tells us, Alexander collected for various reasons and especially to cure the snake bites of his men which the Greeks were unable to do. After Alexander's death there persisted for long during the epoch of the diadochi a close relation between the Grecised kingdom of Syria and the Court of Patna. Seleucus, the successor of Alexander in Syria, gave his daughter in marriage to Chandragupta or Sandrocottu, the ruler of the Ganges

Valley, and stationed at his Court in Patna (B.C., 302). Megasthenes, a Greek, who by his description of India in four books, opened up a knowledge of this country to the whole Western world.

It is little wonder, therefore, that many Indian drugs found their way at an early date into Greek medicine, and it is quite possible that some of the early Indian writers may have adopted a certain amount of theory and practice from the physicians who visited their country, just as Greek art in sculpture stamped its impress upon the ancient statuary of North West India. A futile attempt was made by Haas to explain certain striking analogies between Greek and Indian medicine by supposing Susruta to be a mythical figure, his writings to be merely a distant reflection of the Hippocratic writings and even the name Susruta merely a corruption of the word Hippocrates. Such a view is not now seriously held, and it is conceded by all scholars who have studied Indian medical literature that the Indian writers I have mentioned had a real existence, and that Greek and Indian medicine developed separately, though with points of contact and mutual influence.

Later, during the flourishing period of Alexandria and the domination of the Roman Empire from 300 B.C. to 300 A.D., there was an active intercourse between East and West so that Indian merchants and Brahmans were to be seen frequently at Alexandria and Rome. Theophrastus, a pupil of Aristotle, speaks of a certain Indian physician of his acquaintance who possessed very powerful drugs (aphrodisiacs). Lucian (125—180 A.D.) mentions an Alexandrian student who had made a voyage to India, and Galen (130—200 A.D.) gives a prescription of an Indian physician known to him (an abortefacient). The Byzantine medical writers as Paulus Aegineta also speak of Indian drugs as of something well-known.

An even closer link between the medicine of India and the West developed in the School of Medicine, instituted by the Nestorian Christians at Gondisapor in Central Asia about the 5th century, A.D. Here numerous celebrated physicians were trained in the centuries immediately preceding the Mohammedan conquest of India; and it may be recalled that Harets, the physician of Mohammed, was a Christian trained first in this school and later in India.

We must not be surprised in view of all these points of contact to find numerous instances of agreement and analogy between the Indian and European systems of medicine though the two sprang up and flourished quite independently of one another.

3. INDIAN MATERIA MEDICA AND TREATMENT.

Most elaborate hygienic and dietetic rules were laid down by the ancient Indian physicians both for the preservation of health and for recovery from sickness. Many of these were based upon religious observances.

(a) Cleanliness. Daily washing and the care of the evacuations were inculcated. The teeth were to be cleaned by a fresh stick broken from a bitter tree; the tongue was rubbed; the mouth rinsed; the eyes anointed; the body, head and footsoles oiled every day; and the hair, beard and nails were to be regularly trimmed.

(b) Diet. Two meals daily (corresponding to breakfast and supper) only, were to be taken; and there were rules to cover the articles of diet, order of the dishes, etc,; as in the celebrated rules for health of the School at Salerno (1000 A.D.); a short walk after meals was recommended. The most important articles of diet were: the cereals, especially rice, fruit, vegetables, nuts, ginger, garlic, salt, water (rain water recommended), milk, oil, butter, honey, sugar-cane; of meats, gamebirds and buffalo were considered healthier than pork, beef and fish; and it is to be noted that meat and alcohol, though forbidden by religion, were not so by medical authors.

(c) Exercise alternating with suitable rest, massage, baths, and gymnastics were all held to be of value in preserving health. The daily bath was recommended; but curiously, warm bathing was held to be good only for the lower half of the body, for the upper half it was bad. The wearing of clean clothes was enjoined, while garlands, ornaments and jewels were supposed to confer extra strength and ward off evil spirits.

(d) Elaborate restrictions were placed upon sexual intercourse, which was forbidden on the 8th, 14th and 15th days of the month, and in the morning.

(e) Prophylactic measures were recommended, such as an emetic every week, a laxative every month, and bloodletting twice yearly; these methods of internal cleansing remind one of the practice of the ancient Egyptians, as described by Pliny.

In addition to these general and mainly prophylactic measure, there was a pharmacopoeia containing an enormous category of medicinal substances. External applications, such as baths, inunctions, plasters, fomentations, fumigations, inhalations, gargles, sternutatories, enemata, suppositories, and injections into the urethra and vagina were all made use of.

Emesis was commonly induced by pushing a twig of castor-oil plant down the throat. Enemata were given by means of a bag of leather or a bladder with metal, horn, or ivory tube. For cupping a cow's horn with a hole in the end or a gourd with burning wick was used. Perspiration was induced when desired by application of cow-dung or sand heated in a cloth; by steam baths from a kettle with a long tube leading underneath the bed clothes; or by a jar with medicaments and red-hot stones in it, buried under the patient's bed. Blood-letting was performed by means of a lancet and very careful directions were laid down for its practice; as in the medicine of mediæval Europe, a different vein was chosen depending on the seat of the malady, such as the veins of the forehead, nose, angle of the eye, breast, etc., and probably the practice arose in both parts of the world independently from real benefit obtained in some diseases by this means. For inhalation—a very favourite method of administration—an ingenious plan was pursued; the medicament was powdered, made into a paste and spread around a stalk; when the paste had dried the stalk was removed and the tube of medicament placed within a larger tube of metal or ivory, ignited, and the smoke inhaled.

Two classes of complaint arising out of the peculiar social conditions of India, and to which the ancient Indian physicians applied themselves with particular assiduity were childlessness and poisoning. With regard to childlessness, which counted as one of the greatest misfortunes, it has been mentioned already that most elaborate rules and restrictions were laid down regarding sexual intercourse, while large numbers of aphrodisiac drugs were employed. Regarding the latter, Susruta recommends highly a porridge consisting of the simple ingredients sesame, beans and sugar; this reminds one of the bread and milk diet that has of late been lauded as conducive to fecundity. As regards poisoning, treatment was carried out apparently with a great measure of success. It was the duty of Court physicians to inspect the preparation of the food in royal kitchens, and in suspicious cases birds, monkeys and other animals were used to test the effect of doubtful dishes; in treatment of snake-bite, sucking of the wound, cauterization and extirpation were practised; for antidotes many drugs were used, including nymphaea odorata, brassica latifolia, and aconitum ferox; while magical formulae, prayers and music were not forgotten. The employment of preventive inoculation with snakepoison and the use of snake-stones, though ancient methods in use among those who constantly handle snakes, did not come within the scope of medicine.

As we have mentioned, the recognised number of diseases was very great, these being symptom complexes which on the least departure from type faded away into other groups. In this as well as in its want of anatomical basis lay the real weakness of Indian medicine. The great number of diseases called for a great number of remedies, and it is another evidence of weakness that in some epochs the skill of the physician was estimated by the number of remedies he knew for each disease. In one sense, however, Indian pharmacy was a progressive science, for the ancient physicians were expected to collect their drugs themselves, taking advice in doing so from hunters, shepherds, and hermits.

Medicines were classified from a practical point of view, according to the diseases for which they were efficacious and according to their obvious action as purgatives, antispasmodics, tonics, etc.; but another grouping of a more penetrating scientific type was also used, the drugs being described according to five intrinsic qualities. These were: (1) taste, (2) virtue or property of producing a certain effect as rubefacient, purgative, anti-pyretig, etc., (3) power of heating or cooling, (4) changeability on digestion, and (5) inherent nature depending upon what we shall call the presence of active principles.

The number of medicinal plants used was very great, thus Charaka had 50 groups of 10 each, making 500 remedies in all; while Susruta had 760 herbs arranged in 37 groups. Many of these have found their way into European medicine, and of those adopted by the West some of the most familiar examples are pepper (mentioned in ancient Greek literature as an Indian drug), cumin, sugar-cane, sandalwood oil, mucuna, stramonium, asafoetida, valerian, camphor, jalap, anise, liquorice, coriander, aconite, Indian hemp, nux vomica, linseed, castor-oil, sesame, cinnamon, cardamoms. The juices of these plants were extracted and administration was effected in decoctions, infusions, electuries (made with oil, butter and honey), syrups, pills, suppositories, salves, nasal applications, etc. It appears, therefore, that the debt we owe in this particular to ancient Indian medicine and its herb-gatherers is very great.

In addition to plants, Indian medicine made use of numerous animal substances and minerals. Among the former were blood, bile, milk of various animals, including the camel and elephant, butter, whey, marrow, spermatic fluid, burnt bone and hair, gall stones, urine, cow-dung for inflammation, and elephant dung for leprosy.

Among the minerals used were gold, silver, mercury, sulphate of copper, sulphate of iron, sulphate of lead, subacetate of lead, oxide of lead, litharge, sulphur, arsenic, borax, alum, potash, salt, chloride of ammonium, etc. The mere preparation of these shows a considerable degree of chemical ability. Although mercury was not frequently mentioned in early writings, its use became later very popular, and this is embodied in a proverb—"The physician who understands the healing powers of roots and herbs is a man; he who understands those of water and fires, a demon; he who understands the efficacy of prayer, a prophet; he who understands the virtues of quicksilver, a god."

4. THEORETIC BASIS OF INDIAN MEDICINE.

Three elements or *Doshas* were supposed to pervade the body and, apart from the soul, to carry on the vital processes. These were *Vata* or air situated between the feet and the navel; *Pitta* or bile between the navel and the heart; and *Kafa* or phlegm, between the heart and the head. There was supposed to be a variation of these with age—air predominating in old age, bile in middle age, and phlegm in childhood. Further, each of these primary elements was of five kinds, each kind having some definite bodily function to perform. For example, air being the element productive of movement generally, one of its types produced the voice, the second was the means of respiration and swallowing, the third converted the food into a nourishing juice, the fourth expelled the urine, faeces, semen, menstrual fluid and foetus, and the fifth pervaded the body generally and conveyed the blood and other fluids all over it. From digestive changes in these three elements, the seven primary constituents came into being, viz., chyle, blood, flesh, fat, bone, marrow, and semen. Each of these changed in five days into the constituent following it on the list, so that in one month's development blood has first been produced from chyle; then flesh from blood; next fat from flesh; bone from fat; marrow from bone; and finally semen from marrow.

Disease was produced usually by defective or improper mixtures of the elements or the primary constituents, and it must be noted how closely this theory of disease corresponds to the similar theory of the four humours (blood, bile, phlegm and black bile), which dominated Western medicine from the time of Hippocrates to the 17th century A.D.

It should be added that Indian medicine also recognised other causes of disease, such as faulty nourishment, the weather, injuries, mental causes, attacks by devils, heredity, poison, wrath of the gods, and "Karma" or retribution for misdeeds done in a previous life. With regard to Karma there was, to quote the words of a well-known opera, a great tendency "to make the punishment fit the crime," thus the murderer of a Brahman suffered from anaemia, the incendiary from erysipelas, the spy from blindness, and the unchaste from elephantiasis, while severe ailments that developed from a trivial cause were supposed due to a conjunction of "Karma" with disorder of the primary body elements. According to Susruta there were 1,120 diseases. It is interesting to note, in view of a recent theory, that leprosy, among other causes, was supposed to be due to the frequent eating of fish with milk. There was also a great tendency in ancient Indian medicine to ascribe diseases to the presence of worms in the organs affected; herein the Indian medicine agrees with that of the Egyptians and other early peoples. Insanity was regarded as a possession of devils, and while mild measures were sometimes tried, like cheerful talk, music, etc., generally harsh means of expulsion were adopted, the patient being starved, whipped, imprisoned, or frightened by snakes, wild animals, and threats.

The diagnosis of the disease, from which an individual patient suffered, was made in the first place from careful enquiry into the family history, habits, duration of the illness and its symptons. In the examination of the patient all the senses were called into operation, not only in inspection, palpation and auscultation, but also as regards the taste and smell of the patient's excreta and emanations. Thus the eye noted the general appearance of the patient, the character of the skin, tongue and excretions, and the shape and size of swellings; by the ear alterations in the voice, in the breath sounds, cracking of the joints, crepitus of bones and rumbling of the bowels were perceived; by touching the quality of the skin, the temperature, etc., were noted; taste gave information upon the state of the urine, for instance, as to the presence of sugar, the occurrence of which in diabetes was known to the ancient Indian practitioners though the fact did not find its way into Western medicine till the 17th century, when it was described by Willis. In later Indian medicine great stress was laid upon the characters of the pulse, and the appearance of the urine, but both of these were probably introduced from Western medicine through the Arab conquerors of India from the 10th century onwards. Galen had in the 2nd century written several elaborate treatises on the pulse, and these along with his anatomical and others works, were enthusiastically taken up by the Arabs, translated into Arabic, and introduced into the medicine of the countries which they over-ran.

Prognosis was well developed and shows a combination of shrewd power of observation and deduction, with the most childlike superstition. As to the first, I need not say anything. With regard to the superstition, great stress was laid upon the manner in which the services of the physician were first called; the messenger was to be of the same caste as the sufferer, to be dressed in white, and should ride in a waggon drawn by oxen. Further good omens were the meeting of a maiden, a nursing mother, two Brahmans, a running horse, etc. In estimating the vitality of the patient, good signs were the largeness of his hands, feet, teeth, forehead, ears, shoulders and nipples, a deeply-lying navel, long fingers, and a short penis.

To turn aside for a moment, it is of great interest to note that there are many striking similarities to be noticed between the physical prognostic points in old Indian medicine, and the details considered to be of physiognomial importance by Michael Scot in his Liber Physiognomiae. In this work, which Scot composed during the opening years of the 13th century for the guidance of the Emperor Frederick II. in the attainment of a knowledge of men and of personal health, all sorts of deductions are drawn from bodily appearances as to the character, disposition, and vitality of individuals. The book remained a popular manual for many centuries; and, as the knowledge it contains was undoubtedly drawn from the Moors in Southern Europe, of whose writings Scot was an assiduous translator, we probably have here what was during the later middle ages a valuable contribution to medical literature derived in part from the medicine of India.

5. INDIAN SURGERY.

One of the most outstanding and individualistic features of Indian medical practice was its surgery. Susruta, who is regarded as the father of Indian Surgery, divides its procedures into eight categories, viz:—Excision (of tumours, etc.); incision (of abscesses, etc.); scarifications (in inflammation of the throat, etc.); puncture (of hydrocele, ascites, etc.); probing (in fistula); extraction (of foreign bodies); expression (of abscesses); and stitching (of wounds). These indicate generally a minor type of surgery, but it must not be forgotten that these ancient Indian surgeons performed serious operations, and that Western surgery owes to them instruction in some directions such as in the operation of rhinoplasty.

Susruta directs the surgeon, before an operation, to equip himself with instruments, salts, bandages, honey, oil, water and other requisites. His instruments numbered 125;

including twenty sharp instruments such as knives, saws, trocars, scissors, and needles. These were made of good steel, and carried in handsome wooden boxes. Also there were 105 blunt appliances such as forceps, hooks, tubes, catheters, bougies, and the hand.

Without doubt the ceremonial and practical cleanliness which was inculcated upon these early practitioners was a great benefit in the asepsis of surgical operations, though there does not seem to have been any conscious recourse to antiseptics, as in the primitive surgery of some other peoples. The patient was not allowed to take food before an operation on the abdomen, mouth, or anus; the operation was begun and ended with religious ceremony, and incense was burned during its progress. After it was over, a sesame poultice was applied as dressing, and if the wound became painful it was fomented by a cloth soaked in clarified butter and liquorice. Splints were made of bark, bamboo strips, etc., dressings of cotton, wool, silk, or linen; bleeding was stopped by cold, compression, hot oil, and styptic herbs; and narcosis was sometimes brought about by intoxication with various drugs, sometimes we may assume by hypnotism, which was well-known. Cauterization was a very favourite substitute for the knife in opening abscesses and the like; and splenic enlargement which is so common a complaint in India was treated by puncture of the organ with red hot needles.

The minor surgery like treatment of fracture, removal of foreign bodies, tapping, etc., seems to have been founded on a rational experience and skilfully carried out; while laparotomy, lithotomy, and plastic operations command our respect. Suture of the intestine was described by means of black ants, which were allowed to bite the divided ends of bowel, their bodies picked off and the mandibles left in situ. Lithotomy was practised by the simple method known to early western surgeons as "cutting on the gripe," the stone being pressed down from the rectum till it bulged in the perineum, and then cut upon through all the intervening tissues.

Rhinoplasty for the repair of noses removed as a legal punishment was the most celebrated achievement of Indian surgery. Susruta thus describes it: "If the nose of anyone be cut off, the surgeon shall take a leaf of the same size from a tree, lay it on the cheek, and take out a piece of flesh and skin equally big, stitch the cheek with needle and thread, scarify the stump of the nose, and quickly but carefully place the piece of the cheek over it, attach it with a proper dressing, and sew the new nose firmly on. He shall then carefully insert two tubes, in order to make breathing easier, and when thus raised he shall sprinkle it with oil and scatter on it red sandal wood and other haemostatic powders, whilst white cotton is laid carefully thereon, and it is frequently sprinkled with sesame oil." It was without doubt as the result of hearing of these triumphs of Indian surgery through the Arabs of Southern Europe that Tagliacozzi (1546—1599) about 1590 introduced his operation of fashioning a new nose from skin taken off the patient's own arm.

Cateract operation, Cæsarian section, and embryotomy were other operations known to the early Indian surgeons, and like the early Chinese they seem to have practised inoculation as a prophylactic against small-pox.

In surgery, however, as in medical practice, there was a want both of scientific basis and of cumulative experience, so that surgical technique at the end of the Hindu period remained much the same in principle as, though differing in unimportant details from, the surgery of Susruta.

When the Arab invaders over-ran India, from 1,000 A.D. onwards, they had already assimilated the ancient Greek medicine first from the teachers of Gondisapor, and later from the schools of Alexandria and other Greek cities that they conquered. Their physicians were most assiduous translators, and many of them like Rhazes (900 A.D.) are full of references to Greek writers on the one hand and to Susruta and Charaka on the other. Thus, although they brought a new medicine to India from the West, they had already a sympathetic understanding of the old.

But the history of this third epoch is really an account of Arab medicine, and it must be remembered in any consideration of native Indian medicine that procedures appearing after the 10th century A.D., and certainly any procedures of indigenous practitioners at the present day are influenced by and may even have been borrowed from the medicine of the West, as introduced by the Mohammedan conquerors of the country.

Enough has been said to show that there was an ancient Hindu medicine with characters of its own which was most creditable to the people among whom it arose. This Hindu medicine, though it has succumbed eventually to the medicine of the West, has enriched this medicine by a superior knowledge of some diseases, such as leprosy and diabetes, by surgical contributions like rhinoplasty, and above all by the gift of many useful drugs.

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Early Knowledge regarding Phthisis.

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JOHN D. COMRIE, M.A., B.Sc., M.B., F.R.C.P.,
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EARLY KNOWLEDGE REGARDING PHTHISIS.

By JOHN D. COMRIE, M.A., B.Sc., M.B., F.R.C.P.,
Lecturer on History of Medicine, University of Edinburgh.

In view of the forthcoming Conference in Edinburgh on consumption and other forms of tuberculosis it has seemed to the writer that a short sketch of the earlier development in knowledge and in opinions held regarding this disease might prove generally interesting. The following short article consists, therefore, of some historical notes prepared in connection with an historical and literary section which, at the request of the Executive Committee, the writer has got together for the exhibition connected with the Conference. For several of the references to works that he has quoted he desires to express his thanks to Professor W. Osler and to Dr. James Miller.

Nomenclature of the Disease.

While instances of the disease known at the present day as "Tuberculosis" can be recognised from their symptoms in the writings of the ancient dwellers in Egypt and Assyria, our first definite knowledge may be said to date from the time of Hippocrates (460-355 B.C.), who gave to wasting disease affecting the lungs, accompanied by cough, spit, and fever, the name of "Phthisis."[1] A few of his aphorisms will serve to show that the disease to which he gave this name was essentially the same as that of which we still think when we use the term at the present day:—

"Those who spit up frothy blood bring this up from the lung."

"Phthisis arises chiefly at ages from eighteen to thirty-five years."

"In one affected by phthisis, the appearance of diarrhœa is a deadly sign."

"When an empyema develops in patients from pleurisy, if they get clear of it in forty days after it bursts it is checked; if not, they develop phthisis."

"Autumn is bad for the phthisical."

Without going into the debated question of how far in the age of Socrates and Pericles physicians pursued the study of morbid anatomy, one may say that Hippocrates, who lived in this brilliant age of Greece, was well acquainted, not only with the outward appearances and the future prospects of patients suffering from this disease, but that he understood in a general way the changes in the lungs that accompany its symptoms. Hippocrates, however, does not apparently recognise the infectious nature of phthisis, though in the first book of the *Epidemics* he gives an elaborate description of an acute form of the disease. The subsequent Greek and Roman writers continue the name in the same sense, though the term consumption is quite a modern variation of this word. "Tabes," another Greek term for wasting, was used in a more general sense.

The term "struma" was applied by Celsus,[2] who flourished at the beginning of the Christian era, to the enlarged glands in the neck; while the term "scrofula" (*scrofa*, a pig) was given by the later Roman writers, *e.g.* Vegetius, to the great enlargement of these glands, which sometimes confers upon the face and neck a distinctly pig-like expression. These words have remained in constant use till, in the last century, the identity of cause was established both in the case of enlarged glands and in that of pulmonary phthisis when the two words naturally fell into disuse.

The word "tubercle" was apparently first applied to the little nodules occurring in a diseased lung by Sylvius[3] about the year 1680. This Sylvius is not to be confounded with Jacobus Sylvius, the teacher of Vesalius and friend of Ambroise Paré, whose name we associate with the fissure in the brain which he described, but is the Leyden teacher, Franciscus Sylvius, who was one of the first to originate in the famous Dutch University that system of clinical teaching introduced at its commencement into the Edinburgh Medical School, and continuing one of its chief features to the present day.

The term "tuberculosis," indicating the general disease produced by the formation of these tubercles, seems not to have been introduced until about the year 1843, when Canstatt[4] advances it in his *Text-Book of Pathology.*

NATURE OF THE DISEASE.

The peculiar characters of the disease were, as we have already stated, well understood at the time of Hippocrates. Celsus (*circa* 50 A.D.) divides "tabes" into three types. One of these he calls "atrophy," a condition in which the body is not nourished and becomes emaciated; a second type he calls "cachexia," where the habit of the body is bad and all the nutriment becomes corrupted. "The third, and by far the most dangerous species, is that to which the Greeks give the name of phthisis. It generally takes its rise from the head and thence descends upon the lungs. From this an ulceration proceeds, and there comes a slow fever which although it may have abated yet returns. In this also there is a frequent cough, and pus is expectorated and sometimes something bloody. Whatever comes up, if it be thrown upon the fire, has a bad smell. Therefore those that are doubtful of the disease try it by this test."

With regard to the theory of origin, it may be remarked that the catarrh in which the disease was supposed to be produced originated from the brain, passed down into the nose, and thence as the cold moist humour dropped into the warm lung it produced an ulceration—a crude but by no means an extravagant theory.

Galen's theory regarding the cause of phthisis is simply to regard it as a process of ulceration arising from extravasated blood within the lung or between this organ and the chest.[5]

Among the compilers of the Byzantine Empire there is nothing additional to note, and it seems not to have occurred seriously to any of the ancient writers that this disease was of an infectious nature. To the Arabs the learning of the Ancient World passed over during the Dark Ages when throughout Europe men and races were too busy with the desperate struggle for bare existence to pay any attention to the cultivation of the gentler sciences, and among the Arab writers, for example Rhazes, Avicenna, and Haly Abbas, the infectious nature of various diseases was first distinctly stated. Haly Abbas[6] gives as examples of infectious maladies—leprosy, scabies, phthisis, madness, smallpox, and ophthalmia, and recommends for prophylactic measures that one should not stay long with the sick nor dwell in the same house with them, and that one should use various cleansings and fumigations.

The progress of knowledge regarding the real nature of the disease may be divided into four stages as follows:—

First Stage.—Throughout the Middle Ages the idea of an abscess in the lungs or elsewhere was that it originated simply from the stagnation and putrefaction of a humour in a place to which it should not have come, and the modern idea regarding the specific nature of tuberculosis begins with Sylvius, who first described in 1680 the special structures that we know as tubercles. "I had no doubt," he says, "that in these tubercles lies the hereditary and fatal predisposition to phthisis of certain families, for the tubercles are wont to increase with age and gradually proceed to suppuration. . . . I have come at length to several suspicions about the glands, which are naturally extremely small and almost invisible to the eye, except when they increase somewhat in size and show themselves to the vision scattered everywhere throughout the organs and flesh of our bodies. To these thoughts and conjectures of mine the little glands in the choroid plexus have given rise, which are not visible save in an unnatural state, though then they may reach sometimes to a considerable size, also the glands or glandulous tubercles now in the lung and the glands manifest through various parts of the body in the strumous or scrofulous constitution."

Sylvius thus does little more than suggest an analogy between scrofula and phthisis, while Richard Wiseman,[7] surgeon to King Charles II., defines scrofula, which apparently he does not recognise to be connected in any way with phthisis, as "a tumour arising from a peculiar acidity of the serum of the blood, which, whensoever it lies upon glandulæ, muscle, or membrane, it coagulates and hardens, when it mixeth with marrow always dissolves it and rotteth the bone."

An important advance was made by Richard Morton in his *Exercitationes de Phthisi*, published at London in 1689, in which he for the first time recognised the identity of scrofula and tubercle. He was also one of the first English authors who insisted upon the contagiousness of the disease, and he regarded the presence of enlarged glands upon the surface of the body as a help in diagnosing the internal disease of phthisis.

In 1700 the next step in arriving at our modern knowledge was made by Manget,[8] who, in the additions made by him to the *Sepulchretum* of Bonetus, described the celebrated autopsy upon the body of a young man, aged 17, who had died of phthisis. He found tubercles, which he compares in size to millet seeds, scattered throughout not only the lungs but the liver, spleen, mesenteric glands and intestine, thus describing the first case recorded of *miliary tuberculosis.*

Boerhaave,[9] the most celebrated physician and teacher of the eighteenth century, was content in his aphorisms to trace phthisis back to an ulcer of the lungs, which he supposed to originate from a stoppage of the blood, and its change into purulent matter, thus following the mediæval view.

Morgagni,[10] the founder of morbid anatomy as a science, in his great book on *The Seats and Causes of Disease*, raises the question whether tubercles are really glands, and expresses an adverse opinion, though he offers no solution of the problem as to their real nature.

An important step in discovering the nature of the tubercle was made by William Stark,[11] whose works were published in 1788. He not only attributes pulmonary phthisis in every case to tubercles, but he performed some early researches upon the structure of these little bodies, showing by a process of injection that they contain no blood-vessels. His work was further promulgated and enlarged by Thomas Reid, who is mentioned a little further on as the originator of the curious method of treatment by means of vomits. The great step of deciding that tubercles were not glands, as had been supposed for a century since the time of Sylvius, was made by Matthew Baillie [12] in his *Morbid Anatomy*, published at London in 1797. Baillie was a Scotsman, born at Shotts in 1761, his mother being a sister of the celebrated anatomists, John and William Hunter. In his *Morbid Anatomy*, which contains the earliest pictorial representations of this disease, he describes scrofulous tumours not only in glands but in the pericardium, pharynx, peritoneum and mesentery, tubercles in the liver and spleen, abscesses and tubercles in the kidney, scrofulous vesiculæ seminales, scrofulous ulcer of the bladder, scrofulous testicle, and scrofulous tumours of the cerebral membranes. He declares that the tubercles are not glands, as some imagine, but a special formation in the cellular tissue between the air cells of the lungs, which later burst into the air cells and suppurate. He further appears to have been one of the first to apply the term "cheesy" to the matter in the glands. Along with Baillie should be mentioned Pott,[13] who was the first to describe scrofula as it affects the bones in his classical monograph on *Palsy of the Lower Limbs, which is Frequently Found to Accompany Curvature of the Spine;* also Sir Astley Cooper, who for the first time clearly described tubercle of the testicle in 1830, and Addison,[14] who, in 1855, first recorded the symptoms produced when this disease attacks the suprarenal glands.

The second stage includes the establishment of the fact that tubercles are a special product of disease, and are not enlargements of minute glands; till this became accepted, the idea of the hereditary and unavoidable nature of the disease perforce retained its hold. One of the greatest works on tuberculosis, indeed the first really modern study of the disease, was issued by Bayle,[15] a confrère of Laënnec, in 1810. He describes very accurately the stages of development of the tubercle, and takes the miliary tubercle as the starting-point in every case. Entirely discarding the theory that the tubercle has anything to do with glands or inflammation of the lymphatic system, he regards the cheesy substance in the tubercle as a specific substance characteristic of this disease, and wherever the cheesy material is found he pronounces the process to be tuberculous. He describes several varieties of the tubercle as encysted or not encysted, formed of homogeneous whitish substance, or yellowish in colour, and varying in size from that of a millet seed to a chestnut. He also describes six varieties of phthisis:—Phthisis tuberculeuse, P. granuleuse, P. avec mélanose, P. ulcéreuse, P. calculeuse, P. cancéreuse.

After the time of Bayle and Laënnec several opponents arose. Broussais,[16] during the life of Laënnec, had acrimoniously disputed with him the relation of tubercles to phthisis, and the fact of whether tubercles are of lymphatic origin, holding that "a sanguine inflammation of the lung either pneumonic or catarrhal can, when it is prolonged by the causes which have produced it, impress on the lymphatic bundles of the organ an impulse which makes them degenerate into tubercles, or which forms a dépôt for tuberculous material." Andral,[17] in 1826, further combated Laënnec's view by insisting that tubercles are formed after inflammation and œdema of the lungs by the deposit of minute particles from the inflammatory fluid, which later fuse together into single tubercles.

On the other side of the dispute, Buhl,[18] in 1857, held that miliary tuberculosis appears always as a specific disease by absorption and infection, and further, that an infectious disease appearing in any individual who already suffered with tubercle and cavities of the lungs, is found to be a miliary tuberculosis. He thus established the idea that the virus was situated in the little cheesy nodules, which, if absorbed and disseminated throughout the body, form other minute nodules containing the peculiar poison.

The third stage included the firm establishment of the fact that the tubercle is of an infectious nature, and may be conveyed from body to body. A great and distinctive step was taken by Villemin,[19] a French army surgeon, who, in 1865, was the first to demonstrate the fact which had for long been popularly suspected, to wit, the transmissibility of tuberculosis. His method was to inoculate rabbits with diseased material obtained from phthisical human beings, and by this means he succeeded in making them tuberculous. He obtained similar results by injection of the rabbits with tuberculous material from disease in oxen. It was observed that a tuberculous process was set up at the seat of inoculation, and that later on, after, sometimes, a lengthy period of incubation, the tuberculosis spread throughout the body. He therefore concluded that some material, capable of reproducing itself first at the point inoculated and subsequently through the body, was passed into the animal. In 1868 a somewhat parallel experiment was carried out by Chauveau, who showed that heifers might be rendered tuberculous both by inoculation and by feeding with material from cases of abdominal tuberculosis in the ox. These experiments met with repeated contradiction, but they were placed beyond all doubt in 1877 by Cohnheim and Salamonsen, who performed an experiment similar to, but very much more delicate than, that of Villemin, by introducing into the anterior chamber of a rabbit's eye a minute fragment of tuberculous material in a fresh condition. The immediate effects of the slight prick speedily passed away, but the minute fragment remained visible in the anterior chamber of the eye until it was absorbed. After a lapse of some days granulations appeared on the iris, the aqueous humour became cloudy, and upon examination the eye was found to be infected with indubitable tubercles, which could be actually seen.

The fourth stage includes the careful study of the tubercle by microscopic means to find the actual cause of the infection, which was discovered in 1882 by Koch[21] to be the bacillus that now bears his name. The account he gives might form a model for scientific records by reason of its clearness, conciseness, and convincingness. The manner in which the discovery was ultimately made consisted in over-staining films and sections of diseased material from sputum, glands, &c., by means of an alkaline solution of methylene blue. Next the films were put in a concentrated solution of vesuvin for one or two minutes and afterwards washed in distilled water. By this means the tubercle bacilli were stained blue, and this colour distinguished them from all other bacteria, tissues, &c., which took on the brown colour of the vesuvin. Subsequently Koch was able to grow the bacteria which he thus discovered upon solidified blood-serum and other media.

The search for the infective agent in the disease caused the study of the tubercle, from a histological point of view, to occupy many of the most prominent minds in the latter half of the nineteenth century. Chief among these was Rokitansky[22] (1855), who was the first to discover the giant cell characteristic of the tubercle, and to figure it in the third edition of his *Text-Book on Pathological Anatomy.* Certain cells had previously, in 1849, been described by Lebert[23] as corpuscles or globules proper to the tubercle, but were easily shown by Virchow[24] to be simply degenerated cells. It has been a gradual work of many years carried on by many observers, chief among whom may be mentioned Virchow himself, Weigert, Baumgarten, and Metchnikoff, to show that the lymphocytes, the endothelial cells, and the giant cells are but stages in the formation of a structure which, it has been suggested, is designed to destroy and shut off tubercle bacilli from the remainder of the body.

The question as to the non-identity of human and bovine tuberculosis was raised in 1901 and 1902 by Koch,[25] who pled that all experiments on the point had been performed by inoculation from man to animals, and pointed out the great need for fuller investigation; and the Royal Commission is still engaged in the difficult study of the conditions that govern the relations between these two types of the disease.

DIAGNOSIS.

Hippocrates, as already mentioned, refers in several of his works to incidental points in the nature and diagnosis of phthisis. A point of special importance is, that "if the sputum of a patient when poured upon hot coal has a heavy smell, the person is suffering from phthisis," and he appears to have practised a rough form of auscultation by applying his ear to the patient's side. Aretaeus,[26] a writer about the end of the first century A.D., gives a description of the type of person liable to suffer from phthisis, which has been famous ever since:—"The old seldom suffer from this disease, but very rarely recover from it; the young until manhood become phthisical from spitting of blood and do recover indeed, but not readily; children continue to cough even until the cough pass into phthoe, and yet readily recover. The forms of body most prone to the disease are slender, those in which the scapulæ protrude like folded doors or like wings, in those who have prominent throats, and those who are pale and have narrow chests. As to constitutions, those which are cold and humid as being akin to the nature of the disease."

All through the Middle Ages the diagnosis had to depend upon the outward appearance of the patient and his symptoms.

Sylvius, writing in the year 1680, gives the signs of early phthisis and those of a desperate and incurable case. In the former we have (1) cough coming on after a pneumonia or pleurisy or empyema, lasting a long time, with expectoration of pus; (2) slow continuous fever; (3) wasting of the body, with loss of appetite and prostration of strength. The desperate case he recognises by the symptoms of (1) general emaciation, pallor, and feebleness; (2) troublesome cough, with expectoration of pus and embarrassment of breathing; (3) slow hectic fever.

Not until the year 1761 was any new method devised by which more certain assurance could be obtained as to the unnatural condition of the chest. In this year Auenbrugger[27] published his "new discovery" in the form of a short pamphlet, wherein he described the sounds which are given out when the chest is struck with the fingers. For the purposes of this percussion, the points of the fingers were all brought together and the chest of the patient percussed here and there to determine the resonance of the note. Sometimes the percussor wore a glove, sometimes he performed his examination with the fingers bare. Auenbrugger describes, quite in our modern manner, the physical signs which can be elicited by percussion, and he verified his results by examining the chests of those who died.

It was not till more than half a century afterwards that auscultation was described by Laënnec,[28] while physician to the Necker Hospital in Paris. His work, *Traité de l'Auscultation Médiate*, appeared in 1819, and includes both a large amount of pathological research on the nature of diseases of the chest, together with the physical signs which he founded upon the morbid anatomical work of Bayle and of himself. His account of the physical signs, as revealed by auscultation, presents us with an almost perfect work in clinical medicine, and while they have been reclassified and rearranged, we use them at the present day in practically the same form as that in which they were originally recorded by their discoverer. As examples of the signs which he discovered and whose significance he elucidated by anatomical examination, we may mention the "cracked pot" sound, which he attributed to an excavation close to the surface of the lung; pectoriloquy, which he held to be equivalent to the formation of a ragged cavity; and the crepitant moist râle, which he considered pathognomonic of pneumonia in its earliest stage. His discovery of the stethoscope may be given in a translation of his own words: "In 1816 I was consulted by a young woman labouring under general symptoms of diseased heart, and in whose case percussion and the application of the hand were of little avail on account of the great degree of fatness, the other method just mentioned being rendered inadmissible by the age and sex of the patient. I happened to recollect a simple and well-known fact in acoustics, and fancied it might be turned to some use on the present occasion. The fact to which I allude is the great distinctness with which we hear the scratch of a pin at one end of a piece of wood on applying our ear to the other. Immediately on this suggestion I rolled a quire of paper into a kind of cylinder and applied one end of it to the region of the heart and the other to my ear, and was not a little surprised and pleased to find that I could thereby perceive the action of the heart in a manner much more clear and distinct than I had ever been able to do by the immediate application of the ear. . . . The first instrument which I used was a cylinder of paper formed of three quires compactly rolled together and kept in shape by paste. The longitudinal aperture which is always left in the centre of a paper thus rolled led incidentally in my hands to an important discovery. This aperture is essential to the exploration of the voice; a cylinder without any aperture is best for the exploration of the heart. The same kind of instrument will indeed suffice for the respiration and rhonchus, but both these are more distinctly perceived by means of a cylinder which is perforated throughout and excavated into somewhat of a funnel shape at one of its extremities to the depth of an inch and a half. . . . This instrument I have named the *stethoscope*." It is a fact of pathetic interest that Laënnec shared the same fate as Corvisart, Lancisi, and Bayle, dying of phthisis in 1826 just after a second edition of his immortal work had passed the press.

Piorry,[29] in 1828, published his *Treatise on Mediate Percussion*, in which he suggested a modification of the Laënnec stethoscope into the form of the thin tube with expanded end which we know to-day. Piorry also devised the plessimeter, a thin oval ivory plate with up-turned ends, upon which the percussor struck with one or two fingers, instead of by Auenbrugger's original method. This was supposed to be less uncomfortable to the patient and more valuable in the results it gave to the examiner, and in Piorry's *Atlas de Plessimétrie* a careful and elaborate account is given of the information to be thus elicited.

Since Skoda[30] published his treatise giving a rearrangement of these authors' works, with commentaries of his own, at Vienna

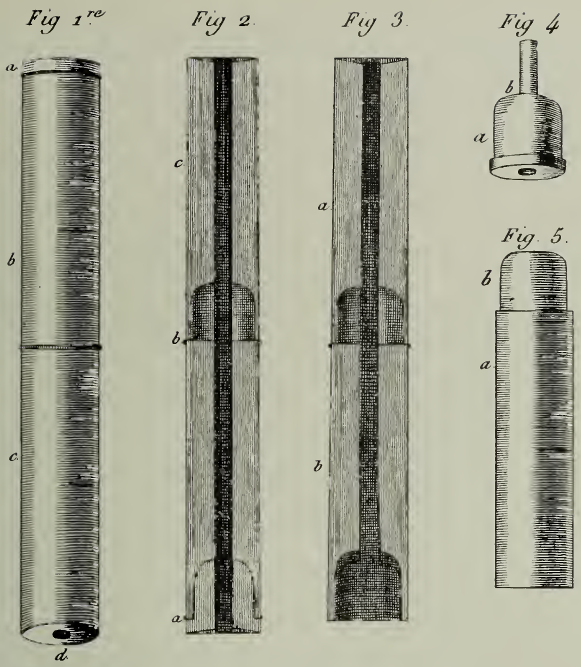

Fig. 1.—Laennec's stethoscope, from his original plate (about $\frac{1}{3}$ actual size). 1, complete; 2 and 3, sections with and without obturator; 4, obturator; 5, lower half, showing joint.

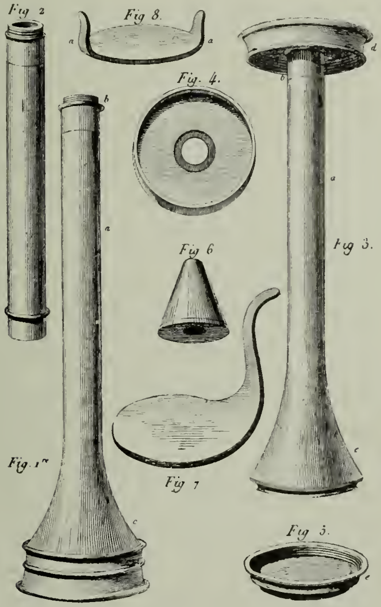

Fig. 2.—Piorry's stethoscope and plessimeters, from his original plate. 1, in portable form; 2, joint for elongation; 3, ready for use; 4, ear-piece; 5, cap for obturator, used separately as plessimeter; 6, obturator; 7 and 8, other forms of plessimeter.

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before the middle of the nineteenth century, there has been practically no new fact added to this important branch in physical examination of the lungs. (See note at end.)

An impulse was given in the direction of exact observation upon the chest by Louis's *Recherches sur la Phthisie* in 1825.[31] In this treatise he introduced his so-called "numerical method." Medical observation hitherto had dealt with the record by men in authority of certain facts relating to each disease. These facts were either accepted as true or declined as false; but Louis has the merit of introducing the idea that symptoms, signs, &c., may be of relative importance or truth in proportion to the frequency of their occurrence. Accordingly we find that his work is specially distinguished by its statistical inquiries, and that all his notes, measurements, &c., are made with the most scrupulous exactitude.

The physical examination of the chest having reached so great a state of perfection, it only remained to discover something which might distinguish the disease from all other similar conditions of the chest. This was effected when Koch in 1882 published his description of the tubercle bacillus. It is unnecessary to do more than mention the valuable diagnostic method introduced in the form of tuberculin by the same authority, and later modified in various ways by other workers.

TREATMENT.

In the classical period of Ancient Greece, when rationalism and simplicity were the distinguishing characteristics alike of medical theory and of medical treatment, a favourite method of healing various diseases consisted in the rest and exposure to the sunshine and fresh air which was to be obtained by a residence at one of the health temples of Asklepios. Of these shrines, some 200 were to be found scattered throughout Greece at different periods, the largest being situate at Epidaurus. Here the phthisical patient, like the rest, was able to perform his oblations to the God of Healing, to recline in marble shelters by which he was protected from the wind, to sleep by night in the fresh air, and to occupy his mind throughout the day by means of plays and spectacles performed in the magnificent open-air theatre and stadium which formed prominent features of the health resort outside the temple precincts.

When we come to the period at which Rome was mistress of the world, we find the great Augustan medical writer, Celsus, possessed of what appears to be a sound appreciation of the lines on which treatment should be conducted in order to alleviate a case of phthisis.[32] He recognised as of great importance a change of air, particularly by a long sea voyage like that to Alexandria, or if the patient was too weak for this, by shorter voyages, or by carriage in a litter. He also lays particular stress upon a proper dietary, recommending milk, gruel, rice, brains, fish, flour mixed with mutton suet or goat's suet, and light wine. As medicine, he prescribes plaintain juice or turpentine mixed with butter and honey. Regarding glands in the neck or strumæ, which, however, he entirely fails to connect with phthisis, he is thoroughly alive to their liability to recur after treatment, and he favours the idea that they should be handled by surgical operation.

Pliny,[33] a slightly later writer (23-79 A.D.), who goes on the principle of including in his cyclopedic work everything which had been mentioned by any authority as a remedy, has nothing to add to this beyond stating that some in his time had found goat's suet an advantageous article of diet, and that others recommended the inhalation through a reed of the smoke from dried cow-dung—a sufficiently disgusting remedy upon which some mediæval methods apparently have been based.

Galen[34] (131-200 A.D.), the greatest medical writer of antiquity, recommended milk as a diet of particular importance so long as it suited the digestion of the patient. He lays great stress upon the point that milk should be warm, and for this purpose he says that the ass, whose milk he specially commends, should be brought to the dwelling of the consumptive patient. Human milk he also regards as a valuable remedy, and he mentions that the digestion of any form of milk is increased by mixing it with a little honey. He also recommends change to a dry climate such as that of Upper Egypt or of Libya, but, like most of the early writers, he considers that the cure is in all cases difficult or impossible.

It is interesting to note that in the earliest medical work of any Germanic people, a leech-book, prepared in Wessex about the time of King Alfred, for a physician who rejoiced in the name of Bald, chronic lung disease is mentioned several times. For its treatment, the inunction of oil is specially recommended, together with various herbal remedies which formed the chief resource of the old English leeches. After directing that the man should be smeared with oil, and that the sides and ribs should be warmed with a little new wool, the leech goes on to say that blood should be let from the sound elbow, but adds, "If thou lettest him too much blood, there will be no hope of his life." The medicine was prescribed as follows:—"Work him a brewit from roots of wallwort and from fleathwort and hoarhound and dill seed. Seethe these in butter. Give him this brewit to eat cold in the morning, and at night dress his meat with oil, and let all his drink be cold." Like Galen, he indicates his despair of any advantage to be derived from even the best of treatment by adding, "In many a man the lung decayeth."[35]

In the Middle Ages a curious superstition arose, and has lasted almost to our own times, regarding the cure of consumption and its allied diseases. While in the time of St. Gregory of Tours (600 A.D.) the power of the Church to confer recovery from curable diseases was openly claimed equally with the right to remit sins, the position as regards the former was gradually given up. Nevertheless kings, as an adjunct of their divine prerogative, were for a much longer time supposed to possess a peculiar healing virtue by the laying on of hands. Clovis, the first Christian king of the Franks (465-511 A.D.), and Edward the Confessor in England (1002-1066 A.D.) both attempted the cure of every kind of disease; but at a later time the royal power to heal was confined to "touching" persons afflicted with strumous glands and sores. These accordingly received the popular name of "King's Evil," a term which, in the seventeenth century, became the recognised expression employed by medical writers to designate this disease. The privilege was exercised by various kings of France and England, but by none so much as Charles II., under whom the physicians and clergy combined to encourage the king in its practice. It is noteworthy that although Charles I. had assiduously exercised this supposed divine prerogative, so shrewd a man as Sir Thomas Browne, the Norwich physician, who exposes many popular superstitions of his time in his *Vulgar and Common Errors*, either did not care, or did not dare, to attack a practice which so obviously lent itself to sarcastic commentary. His namesake, John Browne,[36] Chirurgeon to His Majesty, published in 1684 a work on glandular swellings entitled *The Adenochoiradelogia*, of which the third book, or *Charisma Basilicon*, gives a most interesting account of the healing as practised by the Merry Monarch. John Browne, while he never doubts the reality of the cures, entertains with some favour the explanation that they are due "to the power of fancy and an exalted imagination"—what we should call the "mental factor." A more distinguished contemporary, Richard Wiseman, Serjeant-Surgeon to the King, will not, however, tolerate such an explanation, and points out, to prove the remarkable healing power of the sacred, royal hand, the fact that children and infants benefit equally with adults from its gracious application. It is to be noted that at this time, however, public opinion was not by any means unanimous as to the efficacy of the cure, for Browne finds it necessary to devote a chapter for the purpose of "Several Doubts Resolved about this Curative Method made by Atheists, Sadducees and Ill-Conditioned Pharisees." The cure was carried out with great system and ceremony. In the first place, such as were to appear before the king came to Whitehall or Windsor with recommendations from physicians of good repute all over England. To obtain access to the royal presence a ticket was required, and was only to be obtained after examination by the surgeon of the king, who satisfied himself that the case was really one of scrofula. Provided with the necessary ticket, the patients, rich and poor alike, presented themselves at Court on a day, usually a Sunday, which had been duly advertised as one for the ceremony of "touching," and the following procedure was enacted:—

The king, having taken his seat, attended by the Lord Bishop of Durham and other persons, certain prescribed passages of Scripture were read. The patients were then brought forward singly by the surgeon, and the bishop, on his knees, presented for each a small gold medal strung upon a white silk ribbon. This medal, intended to be a permanent memento and a protection against future onset of disease, was placed by the king upon the neck of each sufferer, and at the same time the affected part was stroked. Passages from the Book of Common Prayer followed, and the ceremony ended when the king publicly washed his hands in a basin and ewer brought forward by two noblemen.

John Browne's work is particularly interesting by reason of some of the cases that he records, and it appears that the patients recovered not at once, but slowly after the "touching" ceremony, while many required a second application. The present of the gold piece, too, it seems, proved a frequent source of fraud, and, to combat this, the examination by the royal surgeon, and the admission by ticket, had been devised. One can well believe that, as Browne writes, there was "scarce any city, town or country that could not speak well of his curative faculty," for between May 1660 and September 1664 Charles had "touched" no fewer than 23,621 cases. In 1665-1666, the years of the Plague and Great Fire in London, no records were made by the Keeper of His

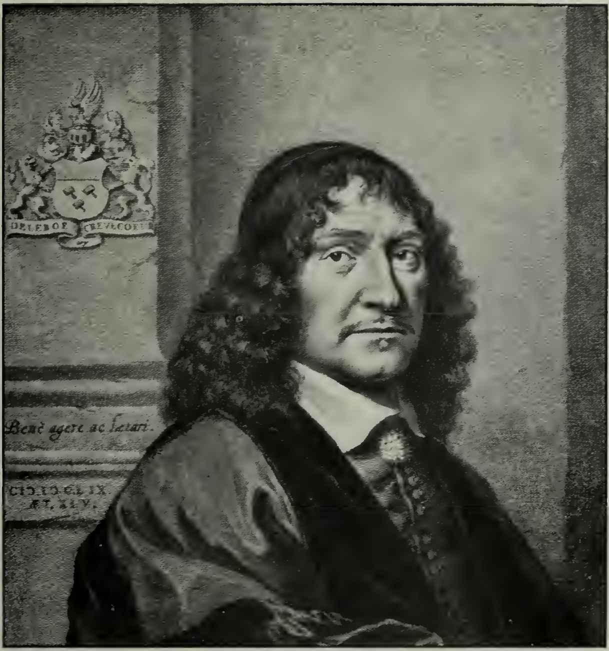

Fig. 3.—Portrait of F. Sylvius.

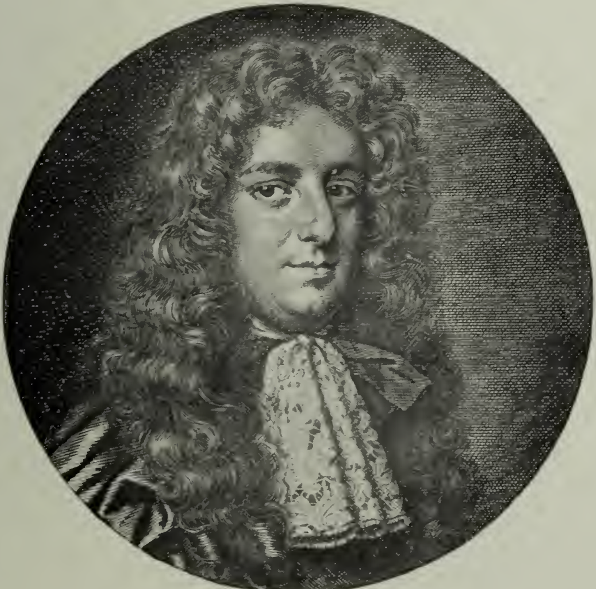

Fig. 4.—Portrait of J. Browne.

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Majesties Closet, and there was probably no "touching." Between 1667 and 1682, however, the practice grew even more popular than before, and it is recorded that in all 92,107 cases were ceremoniously "touched" by this monarch. These figures, when we take into account the relatively small population of England at the time, give an idea of the enormous prevalence of the disease.

Various cases are recorded also as having been cured by Charles I. during his lifetime and by handkerchiefs that had been dipped in his blood after his demise. James II. occasionally tried this healing method, but William III. would have none of it. Under Anne, however, the practice was revived, and by her Dr. Samuel Johnson was "touched" for the scrofula from which he suffered. Since, however, he was but two years old at the time, the responsibility for encouraging the superstition rests, not with the Great Cham of literature, but with his mother and with Sir John Floyer,[37] the physician who had recommended a visit with the child to Court.

Sydenham (1624-1689), the great apostle of the return to simple and obvious methods in treatment of disease, we may presume had no sympathy with this courtly superstition. He advised a method which presented great originality and which he regards as having been curative of phthisis in several cases of his practice. One of these is given in the *Anecdota Sydenhamiana* as follows:—

"Mr. Lawrence Dr. Sydenham's Nephew after a fever fell into a Cough, & other signs of an incipient Phthisis, (the Morbifick matter being violently translated in upon his Lungs) and at length ye Diarrhœa colliquativa came on: then ye Dr sent him into ye Country on Horseback, (tho he was soe weak yt he could hardly walk) & ordered him to ride 6 or 7 miles ye first day (w^ch^ he did), & to encrease dayly his Iourney as he sh^d^ be able, untill he had rid 150 miles: When he had travelld half y^t^ way his Diarrhœa stopt, & at last he came to y^e^ end of his Iourney, & was pretty well (at least somewhat better) & had a good appetite; but when he had staid at his Sister's house some 4 or 5 days his Diarrhœa came on again; The Dr. had ordered him not to stay above 2 days at most; for iff they stay before they are recovered this spoils all again; & therefore he betook himself to his riding again, & in 4 days came up to London perfectly cur'd. The same course hath y^e^ D^r^ put others upon, especially in Pulmonick Diseases, & w^th^ y^e^ like Success when all things elce had failed him: & he was not ashamed to own y^t^ he was fain to borrow a cure from this way now & then when he found himself puzzled wth some lingring Distemper not reducible to a common & know (*sic*) Disease."[38] This "riding cure" of Sydenham may be regarded as a type of early fresh-air treatment.

Cullen[39] (1710-1790) was one of the most influential teachers of the eighteenth century, and his method of treatment may be taken as the type which prevailed universally throughout the eighteenth and early nineteenth centuries. He accepts the view introduced some half a century before his time by Sylvius, that tubercles are small glands scattered through the lung, and that the disease is accordingly to be lessened by preventing in every way their inflammation. The methods he adopts are:—(1) Blood-letting; (2) the administration of a lowering diet, especially of vegetables, together with lowering medicines, of which tartar emetic continued for a century and a half to be the favourite; (3) the avoidance of irritation to the affected lung such as might be caused by great exercise, by any position of the body which produced a compression of the chest, and by the access of cold air to the surface which was apt to cause, he thought, inward congestion. Thus the patient was reduced as much as possible by this "antiphlogistic" treatment, and was kept heaped with clothing and enclosed in a warm room, where he respired over and over again the emanations of his own body.

A curious method of treatment, which owed its origin to a special theory as to the nature of tubercles, and which obtained a considerable amount of acceptance, was that introduced by Reid[40] in his essay on "Phthisis Pulmonalis" in the year 1785. As he insists that tubercles are composed of a viscid secretion wedged in the termination of the bronchial tubes, it is natural that he should recommend a "vomit" for their expulsion. "Patients," he says, "at first are apt to be alarmed at the novelty of the practice, fearing that by taking pukes every day the tone of their stomachs will be injured, and such ideas never want support from the ignorant and interested; but I can safely affirm, and I am warranted to do so by the best of all tests—experience—that I never saw any bad effects from a course of this kind continued for several months with proper precautions: on the contrary, I have scarcely met with one instance where the general health was not materially improved." Ipecacuanha is therefore his great remedy for consumption, administered to cause vomiting morning and evening every day, while he attributes the well-known success of sea voyages to the sea-sickness entailed!

Surgical treatment by the knife was recommended, as we have seen, by Celsus, for enlargement of the glands. For this purpose the Arab surgeon, Abulcasim [41] (*circa* 1000 A.D.), adopting the instrument favoured by the prophet, used a hollow tube-shaped cautery. Towards the end of the eighteenth century the method of treating tuberculous areas with "issues" produced by caustics or by setons was introduced by Pott for the cure of that spinal disease which still bears his name. With regard to the "white swelling," a name given by Richard Wiseman to the scrofulous disease of joints, Sir Astley Cooper, in the 1830 edition of his work on the *Principles of Surgery*, states only the alternatives of amputation and of expectation with good diet and counter-irritation; though Syme, the Edinburgh surgeon, in the following year (1831) brought out his *Treatise on Excision of Diseased Joints.*

Treatment continued much on Cullen's lines till late in the nineteenth century. In 1840 a village doctor, named George Bodington, published an essay on the result of his treatment of numerous phthisical patients at Sutton Coldfield in Warwickshire.[42] Bodington lived at Driffold House in this town from 1836 to 1868, and during this period he attracted so many patients that he was obliged to take in addition Maney House, with a large garden attached, which may therefore be regarded as the first real sanatorium for open-air treatment. Its novelty, which included a stimulating regimen and the respiration of a maximum amount of dry fresh air, will be indicated by two extracts from his treatise:—

"In order, then, to restore a consumptive patient, it will be necessary especially to attend to the following matters:—We shall find, first of all, a rapid and weak pulse, ranging from 120 to 140 beats in a minute, clearly indicating a deficient supply of blood, and the heart and arteries irritable in proportion to this deficiency. This condition must be met at once, not by the means termed 'antiphlogistic,' but with frequent supplies, in moderate quantities, of nourishing diet and wine; a glass of good Sherry or Madeira in the forenoon, with an egg, another glass of wine after dinner, fresh meat for dinner, some nourishing food for supper, such as sago, or boiled milk, according to the taste and digestive powers of the patient. This will be supplying means to rectify the morbid condition of the nutritive functions, and to allay the irritability of the heart and arteries. I have generally succeeded in the course of a few days, or perhaps a week, in reducing the pulse from 130 or 140 down to 90, by means of this diet, and by a systematic use of sedative medicines, and other means. . . . I come now to the most important remedial agent in the cure of consumption, that of the free use of a pure atmosphere; not the impure air of a close room, or even that of the house generally, but the air out of doors, early in the morning either by riding or walking; the latter when the patients are able, but generally they are unable to continue sufficiently long in the open air on foot, therefore riding or carriage exercise should be employed for several hours daily, with intervals of walking as much as the strength will allow of, gradually increasing the length of the walk until it can be maintained easily several hours every day. . . . The cold is never too severe for the consumptive patient in this climate; the cooler the air which passes into the lungs, the greater will be the benefit the patient will derive. Sharp frosty days in the winter season are most favourable. The application of cold pure air to the interior surface of the lungs is the most powerful sedative that can be applied, and does more to promote the healing and closing of cavities and ulcers of the lungs than any other means that can be employed."

His method, however, was received with adverse criticism and ridicule, and though he continued to practise it himself in his private sanatorium, it never obtained much recognition from his contemporaries. The method was practically revived by Henry MacCormac of Belfast in 1865, the keynote of his system being given in his words:—"Tubercle is simply impossible in the case of persons who respire habitually air not pre-respired, and who sleep in an atmosphere incessantly renewed. . . . Pure respiration is the law of life, impure respiration is the law of death. . . . The materials for the possible recovery from phthisis, I repeat, lie round every door." Upon the foundation, laid by these pioneers, has been built up the modern sanatorium system. One of the greatest steps in advance upon this line was recently taken by the German Legislature, which made it possible to bring fresh-air treatment within reach of the humblest dwellers in crowded towns by permitting insurance companies to found large sanatoria in that country for the more economical treatment of work-people insured with them.

Another essential adjunct in the attainment of this end was found in the Consumption Dispensaries which sprang up in the large towns during the last two decades of the nineteenth century, for the purpose of systematically investigating the conditions of the disease in the dwellings of the poorer classes, and of forming controlling centres to advise the sick and their friends, to select those suitable for hospital, and to supervise patients after their return home. To Edinburgh belongs the credit of having been the first city to possess a large institution of this type in the Victoria Dispensary for Consumption, founded there by Philip [43] in 1887.

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Note.—The flexible stethoscope was introduced in Edinburgh by Dr. Comins as early as the year 1829 (*Lancet*, 29th August 1829); C. T. Williams gives to C. J. B. Williams the credit of having been the first to fashion a binaural form in the same year (*Brit. Med. Journal*, 6th July 1907); while the addition of rubber tubes was a natural adaptation of a slightly later date. Aitchison Robertson suggested the multiple stethoscope for teaching students, in which by joining several binaural tubes to one chest-piece a number of persons can listen at one time (*Trans. Edin. Medico-Chir. Soc.*, 1902). All these changes are, however, designed for the convenience of the listener rather than to increase the delicacy of his observation.

Michael Scot: A Thirteenth-Century Scientist and Physician

BY

JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P.E.

Lecturer on History of Medicine and on Clinical Medicine, University of Edinburgh

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By JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P.E., Lecturer on History of Medicine and on Clinical Medicine, University of Edinburgh.

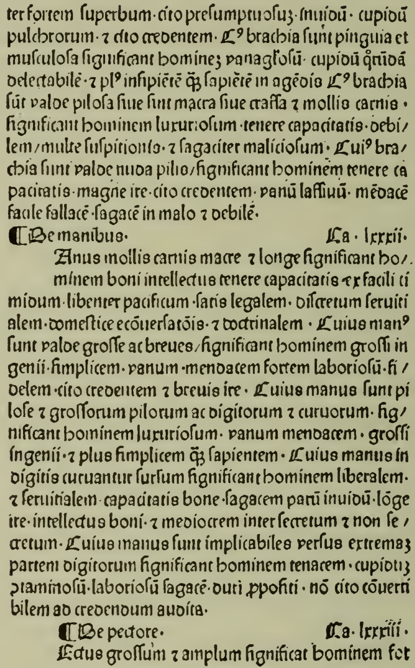
MICHAEL SCOT, the subject of our sketch, was born, according to Wood Brown[1] who has left the most comprehensive record of his elusive personality, somewhere on the Scottish Borders about the year 1175. His death is fixed by the same authority for the year 1232, and took place in the countryside of his birth, which also claims his grave. The period of Scot's life was perhaps the most prosperous that the South of Scotland has ever seen. The Angles of Northumbria had been driven out and peace had reigned in Lothian for 200 years. The Norsemen had been expelled from the Scottish Mainland. On the east coast, Berwick, reputed the chief port in Britain before the fourteenth century, was at the height of its prosperity; and in the West, Glasgow Cathedral, to-day the finest ecclesiastical building in Scotland, was then rising under Bishop Jocelyn's hand. The beautiful abbeys of Jedburgh, Kelso, Melrose, Dryburgh, Newbattle, and Holyrood had been founded as centres of light and learning by David I. half a century before. Here amid the pleasant vales and woods of Tweedside and Lothian peaceful Norman settlers had introduced art and learning without the strife from which England then suffered under Richard, John, and Henry III.

In these surroundings Michael Scot spent his boyhood's days, passing at a later period through the schools of Oxford, Paris, and Bologna. Both on the Scottish Borders and in Italy popular tradition holds strong memories of him, sometimes of a rational, sometimes of a supernatural kind; and he forms one of a group of pre-Renaissance scholars, all of whom were viewed by their age in a somewhat similar light. Scot was a youth of 18 when Albertus Magnus, the *doctor universalis* of the Schoolmen, was born, and Roger Bacon, the *doctor admirabilis*, was a young student of 18 when Scot's life ended. At Paris he earned the name of "Michael the Mathematician"; and for the practical application of this science, then much in demand for architectural enterprises, he was distinguished later at the Court of Frederick II. He must also have studied theology, for towards the close of his life in 1223 the Pope Honorius III. desired Stephen Langton, the Primate of England, to prefer Scot to a suitable vacancy, recommending him as distinguished among learned men for his remarkable gift of knowledge, and himself nominated Scot for the Archbishopric of Cashel in Ireland. This post, however, Scot declined because of his ignorance of the Irish vernacular.[2] Greek and Arabic were known to Scot, and his greatest life's work consisted in translations from these languages, which were doubtless learned by him at the period when he lived among the Moors and Greeks of Sicily.[3] With regard to his linguistic attainments, it is true that Roger Bacon speaks disparagingly :—" Though we have numerous translations," Bacon says, " of all the sciences, by Gerard of Cremona, Michael Scot, Alfred the Englishman, Hermann the German and William Fleming, there is such an utter falsity in all their writings that none can sufficiently wonder at it. For a translation to be true, it is necessary that a translator should know the language from which he is translating, the language into which he translates, and the science he wishes to translate. But who is he and I will praise him, for he has done marvellous things. Certainly none of the above named had any true knowledge of the tongues or the sciences, as is clear, not from their translations only, but their condition of life." [4] This wholesale depreciation is overdone and is the diatribe of a jealous man. It must have been bitter for Bacon, possessed of brilliant gifts and yet neglected by scholars, misunderstood by the laity, and condemned by the church to a life of obscurity and periods of long imprisonment, to see others no more learned, like Scot, dipping as they would into forbidden sciences, in high popular repute, and favoured by courts and prelates.

Between the years 1200 and 1208 Frederick, King of Sicily and later Emperor of Germany, a prince deservedly famous for his talents and for his encouragement of learning, lived at Palermo as a boy of 6 to 14 years, under the tutelage of the Canons of the Cathedral. Here Michael Scot acted as his tutor. In Palermo, therefore, at the half-Moorish court, Scot spent the opening years of the thirteenth century, and here he acted as Astronomer and Astrologer to the Emperor, composing for him two astrological books, the *Liber Introductorius* and *Liber Particularis*, which were of a popular or explanatory nature. In the Oxford MS. of the latter[5] from which I show an illuminated capital representing Scot himself, the colophon runs, " Here ends the book of Michael Scot, Astrologer to the Lord Frederick, Emperor of Rome, and ever august; which book he composed, in simple style, at the desire of the said Emperor. And this he did, not so much considering his own reputation as desiring to be serviceable and useful to young scholars, who of their great love for wisdom, desire to learn in the Quadrivium the Art of Astronomy."

A much more important book, judging it by its enormous vogue throughout the next four centuries, is the *Liber Physionomiæ.* At the age of 14 Frederick was married; and Scot dedicated this book as a guide in the knowledge of men, to the pupil about to pass from his charge into the stormy life of European politics. The work attained a great popularity in MS., and after the introduction of printing no less than eighteen editions appeared between 1477 and 1660. Part of the work is influenced by Aristotle's *History of Animals*; part is taken from the *Liber ad Mansorem* of Rhazes; but the greater portion is apparently from Scot's own observation. Of the three books into which it is divided, the first deals with the mysteries of generation and birth; the second expounds the signs of the different complexions, as revealed in various parts of the body or by dreams; and the third explains what signs of the inward character can be read in each of the bodily members. The specimen on page 4 will show its nature.

Scot's tutorship at an end with Frederick's marriage, he next set forth on a literary mission to Spain, where a regular school of translation existed at Toledo. Probably when Scot left Palermo he did so at the instigation of the Emperor Frederick and to him he dedicated the translations which he produced from the Arabic MSS. available in Spain. Two translations of Aristotle's Natural History of Animals, called respectively the *De Animalibus ad Caesarem* and the *Abbreviatio Avicennæ*, were the first-fruits of his labours. That he also set up a chemical laboratory in Toledo must appear from the fact that two books on Alchemy also issued from his pen, the *Liber Luminis*[6] and *De Alchimia.*[7] In the latter he gives a formula by which he states he had succeeded often in changing lead into the finest gold. Gold that is which would stand the tests then in common use. Another important astronomical work was his translation in 1217 of the *Sphere* of Alpetrongi, which as witnessed by Vincent of Beauvais and by Albertus Magnus



ter fortem ſuperbum· cito preſumptuoſuȝ· inuidū· cupidū pulchrorum· ⁊ cito credentem· Cꝰ brachia ſunt pinguia et muſculoſa ſignificant hominē; vanagloſū· cupidū q̄nīdā delectabilē· ⁊ plꝰ inſipiētē ꝙ̃ ſapiētē in agēdis Cꝰ brachia ſūt valde piloſa ſiue ſint macra ſiue craſſa ⁊ mollis carnis· ſignificant hominem luxurioſum· tenere capacitatis· debilem/ multe ſuſpitionis· ⁊ ſagaciter malicioſum· Cuiꝰ brachia ſunt valde nuda pilis/ ſignificant hominē tenere capacitatis· magne ire· cito credentem· vanū laſſiuū· mēdacē facile fallacē· ſagacē in malo ⁊ debilē·

¶ De manibus· Ca· lxxxii·

Anus mollis carnis macre ⁊ longe ſignificant hominem boni intellectus tenere capacitatis ex facili timidum· libenter pacificum· ſatis legalem· diſcretum ſeruitialem· domeſtice ecōuerſatōis· ⁊ doctrinalem· Cuius manꝰ ſunt valde groſſe ac breues/ ſignificant hominem groſſi ingenii· ſimplicem· vanum· mendacem fortem laborioſū· fidelem· cito credentem ⁊ breuis ire· Cuius manus ſunt piloſe ⁊ groſſorum pilorum ac digitorum ⁊ curuorum· ſignificant hominem luxurioſum· vanum mendacem· groſſi ingenii· ⁊ plus ſimplicem ꝙ̃ ſapientem· Cuius manus in digitis curuantur ſurſum ſignificant hominem liberalem· ⁊ ſeruitialem· capacitatis bone· ſagacem parū inuidū· lōge ire· intellectus boni· ⁊ mediocrem inter ſecretum ⁊ non ſecretum· Cuius manus ſunt implicabiles verſus extremaȝ partem digitorum ſignificant hominem tenacem· cupiduȝ ꝯtaminoſū· laborioſū ſagacē· duri ꝓpoſiti· nō cito cōuertibilem ad credendum audita·

¶ De pectore· Ca· lxxxiii·

Ectus groſſum ⁊ amplum ſignificat hominem fot

Page from *Liber Physionomiæ* (early printed edition of 1497).

"Chapter 82, On the Hands.—Hands of soft flesh, slender and long, show a man of good intellect but little strength, easily frightened, gladly peaceful, pretty formal, discreetly obliging, of domestic habits and erudite. Hands that are very thick and short show a man of slow intelligence, simple, vain, lying, strong, hardworking, faithful, credulous, and good tempered. Hairy hands with strong hair and curved fingers show a man wanton, vain, lying, of slow intelligence, and more simple than wise. Hands with fingers curved backwards show a man liberal and obliging, of good strength, sagacious, little envious, wrathful, of good intellect, and moderately secretive. Hands with fingers stiff towards the ends show a man persistent, viciously acquisitive, hardworking, sagacious, of set purpose, not quickly persuaded to believe what he hears."

influenced profoundly the astronomical beliefs of the time; and which probably was prepared for the Astronomical Congress assembled in 1218 by the King of Castile at Toledo.[8]

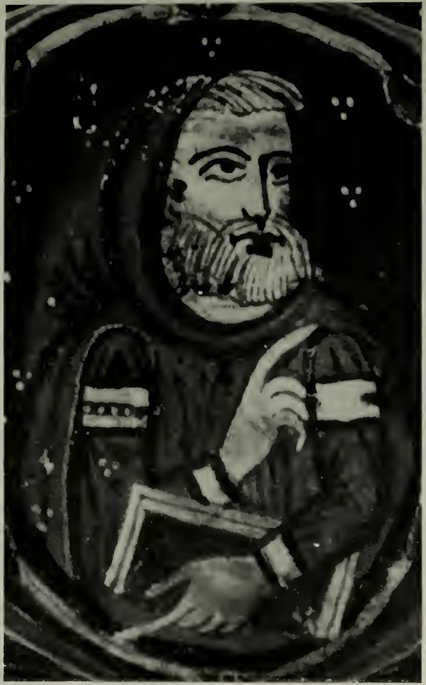
Numerous minor writings and fragments are attributed also to Scot, *e.g.*, *De Secretis Naturæ*,[9] on Geography, etc.

But the most renowned of all Scot's works was his translation from the Commentaries of Averroes of Cordova. Averroes (1126-98) was the great rationalist and arch-heretic of his time, banned alike from the paradise of Mohammedans and the heaven of the Christians; so that to translate and publish his works was a sin which probably lost for Scot any important ecclesiastical preferment, and which was one of the causes of embroilment between Frederick II. and the Papacy. Ten years after Scot's return from Toledo, Frederick decided to publish the translations of Averroes, which he had commissioned Scot and others to make, and this he did by sending copies to the various Universities. Roger Bacon speaks of Scot appearing with these translations in England in the year 1230, and of the impetus which they gave to the Aristotelian philosophy in the schools.[10] From this journey Scot appears never to have returned but to have died on a visit to his northern birthplace.

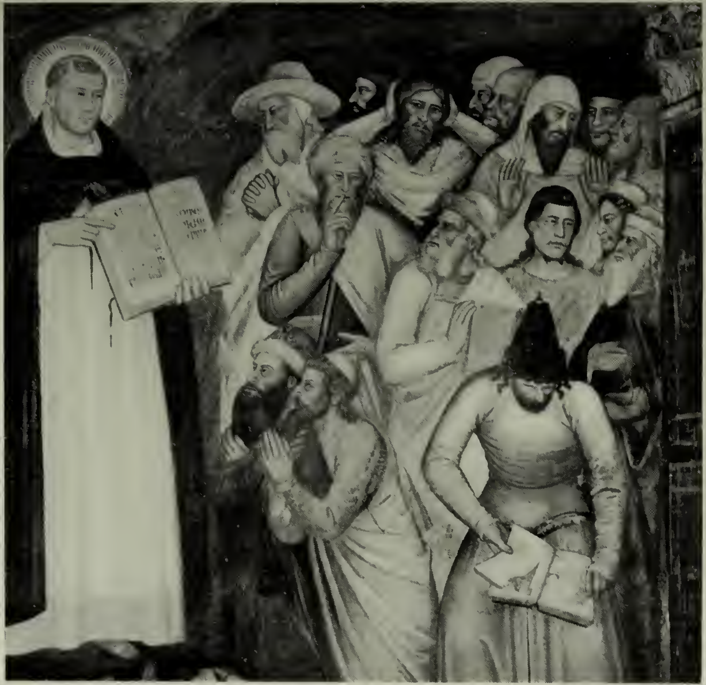
Scot's activities as a doctor naturally interest us particularly. Frederick returned in 1220, after a successful campaign against his rival Otho, to Palermo, where he was soon joined by Michael Scot fresh from his ten years of literary labour in Spain. The latter again took up the post of Court Astrologer in which he was busied casting horoscopes and forming predictions; and on these subjects he issued several minor works. He also became physician to Frederick. Sir Norman Moore describes the type of thirteenth-century physician in England as follows, a description which aptly fits Michael Scot: "It is clear," he says, "that considerable attainments were necessary before a man was styled medicus or physicus. His study chiefly consisted in reading books and hearing lectures on books in the University. Most learned men had read some medicine, or knew something about it; and some ecclesiastics had specially devoted themselves to a study the use of which was so suitable to their profession. Of this kind was the Abbot of Crokestone 'in arte medicina erudito,' who attended John in 1216 at Newark."[11]

Two influences which came into being early in the thirteenth century had a great effect in raising the knowledge and the status of the medical profession. The first of these was the establishment by Pope Innocent III. of the Holy Spirit Hospitals beginning in the year 1204. Virchow[12] has told the story of these hospital foundations, and makes it clear that probably every town of 5000 inhabitants, everywhere throughout Europe, before the close of the thirteenth century had a hospital. Those in the larger towns at least, according to Walsh,[13] were model hospitals in many ways, and ever so much better than many hospital structures erected in post-medieval centuries. One of these thirteenth-century hospitals of the Holy Spirit is still standing at Lübeck in Germany. The other influence which had a profoundly steadying effect upon the medical profession, and with whose inception it is more than probable that Michael Scot was concerned, is found in the enactments of Frederick II. regarding the practice of medicine in Italy and Germany.[14] These enactments, which fixed the period of medical study at Salerno and Naples, instituted a State examination for the licence to practise, prescribed a scale of medical fees, and nominated inspectors for maintaining the quality of drugs, were issued in the year 1240. By this time Michael Scot had been dead eight years; but he is mentioned by de Renzi as one of the early teachers at the medical school of Salerno,[15] and on account of his intimacy with Frederick it is likely that he was consulted in any legislation likely to affect it. Since this formed the first attempt at a State organisation of medical studies, we shall be justified in feeling a measure of gratitude to old Michael Scot.

As a practising physician, Scot enjoyed a great reputation. Dempster, who was Professor at Bologna and Pisa from 1616 to 1625, speaks of Scot's "singular skill," calling him also "one of the first physicians for learning";[16] and another writer tells that he was noted for the cures he effected in difficult cases, and that he excelled in the treatment of leprosy, gout, and dropsy. A work on the urine by Michael Scot exists now in an Italian translation only; but in a later collection, recipes are quoted taken from "the book of Master Michael Scot, Physician to the Emperor Frederick, and other Doctors."[17] An interesting marginal note occurs on two early thirteenth century MSS. of Scot's *De Animalibus ad Caesarem*, recording apparently by his own hand a consultation at Bologna in the year 1221. One of these is preserved in the Library of Gonville and Caius College,[18] the other is the property of Amtmann Hof, Harford, North Germany, and appears from its abbreviations to be a copy.

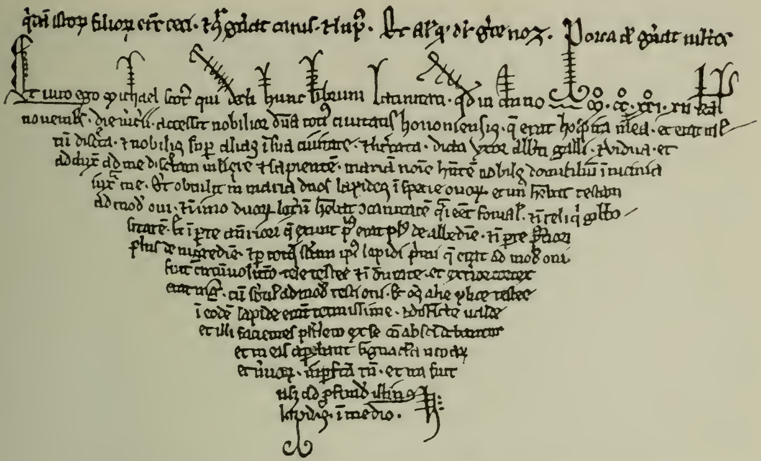


Portrait of Michael Scot from Bodleian MS., "De Physionomiæ" (14th cent.).



Fresco by Taddeo Gaddi in Spanish Chapel, Florence, "St Thomas Aquinas converting Unbelievers," showing Michael Scot, the central kneeling figure with skull-cap, in front row (*ca.* 1330).

Reputed effigy of Michael Scot in Melrose Abbey.



Facsimile of note in margin of 13th century MS. (slightly reduced).

The note runs as follows :—

"I, Michael Scot, who put this book into Latin, declare that in the year 1221, on the first of November, a very noble lady of the state of Bologna, who was my hostess, the widow of Albertus Gallus, discreet, noble above other ladies in her town and learned, brought to me a discreet and wise woman named Mary, dwelling in a fine house of the neighbourhood. Mary showed me two stones like eggs, one of which had a shell like an egg. On one side it was concave and elsewhere bulging. And on the front which came out first there was more whiteness—behind it was blacker. Through the whole substance of the first stone itself which was like an egg were layers of hardened shell and the outer layer was black, but yet light like eggshell. And all the other windings of shell in the same stone were very light, and very distinct, and they formed a powder when they were cut away, and among them appeared imperfect signs of veins and sinews. So it was, right to the middle of that stone. And the stone compared with its bulk was very light, and among all its pores appeared a passage of veins and sinews, and it was whiter on cutting into. And it was possible to cut the stone with a knife, and between the outer layer like an egg-shell and the inner pores was, as it were, a meal of powdered chalk, and that stone came from the womb of the said Mary on the first of July of the same year. And on the eighth day of July another stone of the same kind came out and of the same weight according to its bulk, for it was somewhat smaller, of darker colour and compressed on each side. And it seemed to the said Mary that for eight years before the passage of these stones the tumour was constantly lessening somewhat. And on the said stones were no furrows as in stones from the kidneys or bladder; and between the projections were signs of white skin, which you find to be due to its long duration. The said Mary consulted me on account of difficulty in urination."

It appears from this note that the stones were calcified fibroid tumours, and that Scot was familiar with the different appearance of stones from the bladder and kidneys. The consultation shows that he was recognised as a urinary specialist.

On a later folio of this Cambridge MS. is given a prescription similarly placed in the margin. Numbers of these prescriptions have been handed down associated with the name of Scot, notably certain "Pilulæ Magistri Michaelis Scoti,"[19] in a thirteenth-century MS. collection, which are commended by one scribe for all sicknesses in terms that suggest the advertisement of a modern patent medicine. Their main constituents are aloes, rhubarb, and nine fruits and flowers made into a confection. They might fairly be described as good after-dinner pills, but the thirteenth-century copyist recommends them to relieve headache, purge the humours wonderfully, produce joyfulness, brighten the intellect, improve the vision; sharpen hearing, preserve youth, and retard baldness.

A totally different aspect of Michael Scot is the reputation which he enjoyed, both during life and later, as a wizard. To the unlettered and unlearned of the thirteenth century, a man who had plunged deep into the knowledge of the mysterious East could not escape being regarded as a necromancer. The disapproval of the Church attaching to his translation of Averroes would tend to strengthen this idea; and the fama appears to have been further increased by Scot's deliberate actions. *Populus vult decipi*, and by many outstanding men, especially if they be inclined to politics, the wonder of the ignorant crowd is desired as much as the appreciation of the learned few. This fame, which lives to-day in Michael's own homeland of the Scottish Borders, is expressed by his illustrious namesake, Sir Walter Scott.*[20]

Alas, however, for the fallibility of popular tradition, the camp at the base of the Eildon Hills was known to the Romans as *Trimontium*!

In Italy, Scot's reputation as a seer of the future and as a magician was so firmly established within the century following his death that Dante places him in the *Inferno* with the Grecian soothsayers, Calchas and Eurypilus.[21]

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* Sir Walter Scott's attempt to identify the tutor of Frederick II. with Sir Michael Scot of Balwearie, cannot now be accepted, since the great

> "Quell' altro, che ne' fianchi è cosè poco,
> Michele Scotto fù, che veramente
> Delle magiche frode seppe il guioco.
>
> That other, round the loins
> So slender of his shape, was Michael Scot,
> Practised in every slight of magic wile."
> (*Cary's Translation.*)

One of Scot's predictions was the death of his patron Frederick in a City of Flowers, believed by Frederick to be Florence which he therefore avoided, only to die at Fiorentino. Another was Scot's own death from the blow of a stone on the head. To prevent this he constantly wore an iron cap, that proved useless in the end, because he was struck by a small piece of masonry from the roof of a church in which he was hearing the mass, bare-headed.

Boccaccio in the next century speaks of Scot's magical or conjuring tricks during his stay at Bologna,[22] and a great number of such tales sprang up later round his name. Two of these later traditional tales give the impression that Scot relied for some of his effects upon hypnotic suggestion. At a feast held in January he caused vines with ripe clusters of grapes to appear on the table. The guests were bidden to choose each a bunch, and wait for a given word. At the word "cut" the grapes disappeared and the company found themselves each with a knife in one hand and his neighbour's sleeve

Michael is known to have died some sixty years before Sir Michael went on his embassy to Norway in 1290.

> "In these far climes it was my lot
> To meet the wondrous Michael Scott;
> A Wizard of such dreaded fame,
> That when in Salamanca's cave
> Him listed his magic wand to wave,
> The bells would ring in Notre Dame!
> Some of his skill he taught to me;
> And, Warrior, I could say to thee
> The words that cleft Eildon Hills in three,
> And bridled the Tweed with a curb of stone:
> But to speak them were a deadly sin;
> And for having but thought them my heart within,
> A treble penance must be done."

in the other. Another tale records how at a banquet given in Palermo by Frederick to celebrate his coronation in 1220 Scot and a companion suddenly appeared dressed in Eastern robes and offered to perform a wonder. The weather being hot Frederick asked for a cooling shower of rain, which the magicians produced with a sudden storm. So far the entertainment had probably been carefully prepared and stage-managed; and as a reward Scot asked that a German baron Ulfo should be allowed to accompany them upon an expedition. This being granted, it seemed to Ulfo that they set forth in galleys passed out into the Atlantic to a strange land, where followed battles, marriage with a lovely princess, twenty years of wedded bliss, and a large family of sons and daughters. Finally the magicians reappeared and persuaded him to accompany them back to Palermo, and on their return what was Ulfo's astonishment and grief to find the banquet of twenty years before no further advanced, and all his hardships and joys only a dream never to be repeated.[23]

As to Scot's personal appearance, Dante gives the impression of a spare man. There is a sculpture in Melrose Abbey which tradition reports to be the head of Michael Scot; and this shows thin cheeks, a sparse beard, and eager eyes. A similar appearance is shown by one of the figures in a picture on the wall of the Spanish Chapel in Florence. It represents a group of unbelievers receiving conversion from St Thomas Aquinas. In the front row two kneeling figures, one with a diadem and one wearing a metal head-piece represent probably the Emperor Frederick and Michael Scot; the hand of a figure which can be identified as Averroes points to the latter who also bears a strong resemblance to the Melrose effigy. The painting is attributed to Taddeo Gaddi,[24] a pupil of Giotto, and gives probably a faithful enough representation of Scot painted a century after his time. There are two other likenesses in illuminated MSS. of the *Liber Particularis* and *Liber Physionomiæ* dating from the early fourteenth century and preserved in the Bodleian Library.

I have referred to the manner of Scot's death as handed down by tradition. His grave is still shown in Melrose Abbey, but his resting place is also claimed by other places on the borders, such as Holme Coltram, Glenluce, and Burgh-under-Bowness. The *Book of Might* so dreaded in popular tradition may have been the Commentaries of Averroes, of which the publication had been delayed for twenty years to avoid injuring the susceptibility of the Church, and which Scot was bringing to the Western Schools when he died.

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2. „ Corpus Christi College, CXXV. (xxx.), 13th cent., *De Alkemia.*
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4. „ *Ibid.*, 266, 15th cent., *Liber Introductorius* (Astronomy).
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13. *Ibid.*, 12, D. vi., 15th cent., *Astronomy.*
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Scurvy in North Russia

BY

JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P.

Lecturer on History of Medicine and on Clinical Medicine, University of Edinburgh; lately Consulting Physician North Russian Forces

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SCURVY IN NORTH RUSSIA.*

By JOHN D. COMRIE, M.A., B.Sc., M.D., F.R.C.P., Lecturer on History of Medicine and on Clinical Medicine, University of Edinburgh; lately Consulting Physician North Russian Forces.

Historical:—Scurvy is a disease which has existed from early times. The first clear account of it is given by the Sire de Joinville, Seneschal of Louis IX., during the disastrous Crusade in the year 1249. He says, "We were attacked by the Army sickness, which was such that our legs shrivelled up and became covered with black spots, and spots of the colour of earth like an old boot; and in such of us as fell sick the gums became putrid with sores and no man recovered of that sickness, but all had to die. It was a sure sign of death when the nose began to bleed. . . . The sickness became much more severe throughout the camp, and the proud flesh in our men's mouths grew to such excess that the barber-surgeons were obliged to cut it off, to give them a chance of chewing their food or swallowing anything." As a result of the general weakness caused by scurvy throughout the army, the Saracens invaded the camp, killed great numbers of the Crusaders, and captured King Louis and his knights.[1]

In the sixteenth and seventeenth centuries scurvy was endemic in various parts of Europe, and in the eighteenth century it produced an enormous number of deaths among sailors serving in the Seven Years War and elsewhere. For example, in the voyage of Lord Anson round the world in 1740-44, after the ships had been at sea from 18th September 1740 to 7th March 1741, scurvy broke out with great severity among the crews. The most common symptoms were, in the words of the Rev. R. Walter, who edited Anson's papers: "Large discoloured spots, dispersed over the whole surface of the body, swelled legs, putrid gums, and, above all, an extraordinary lassitude of the whole body, especially after any exercise, however inconsiderable; and this lassitude at last degenerates into a proneness to swoon, and even die, on the least exertion of strength, or even on the least motion." He adds that "alacrity of mind and sanguine thoughts were no contemptible preservatives from its fatal malignity." Further symptoms were "putrid fevers, pleurisies, the jaundice, and violent rheumatic pains, and sometimes it occasioned an obstinate costiveness, which was generally attended with a difficulty of breathing; and this was esteemed the most deadly of all the scorbutic symptoms. At other times the whole body, but more especially the legs, were subject to ulcers of the worst kind, attended with rotten bones and such a luxuriancy of fungus flesh as yielded to no remedy." In one month (April 1741) no less than 43 men were buried from H.M.S. *Centurion*, and when Juan Fernandez was reached early in June, over half the crew had perished, and the remaining 210 men were so weak that the ship could hardly be brought to anchor. Finally, 12 or 14 men died as they were being landed in the boats, but the remainder speedily recovered on the diet of vegetables, fresh fish, and goats' flesh, which the island provided.[2]

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* Communicated to the Medico-Chirurgical Society of Edinburgh, 21st January 1920.

With regard to treatment, the use of fresh vegetables has long been known. Wirtzung, in the end of the sixteenth century, recommends fresh watercress, or horse-radish, or scurvy-grass (cochlearia) pounded up in wine or beer; fresh fruit and vegetables had been successfully used by the Dutch since 1564, and by Sir R. Hawkins in the *Dainty* in 1593; and John Woodhall, in *The Surgeon's Mate* (1636), mentions the virtues of lemon juice for scorbutics. James Lind, an Edinburgh graduate, and later Physician to Haslar Hospital, reintroduced the use of fresh vegetables and fruit, especially oranges and lemons, about 1754. As Lind, unfortunately, advocated the use at sea of *preserved* orange and lemon juice, which failed in the hands of the famous Captain Cook on his voyage to the southern hemisphere in 1773-74, this again went out of favour.[3] Sir Gilbert Blane, as head of the Navy Medical Board in 1795, made *fresh* lemon juice an essential part of the naval dietary, with the result that within a few years scurvy virtually disappeared from the Navy.[4] The curative properties of potatoes among civil prisoners suffering from scurvy were pointed out by Dr Baly about the middle of the nineteenth century. The preventive action of vegetables has been variously attributed to potash salts, to vegetable acids, and to their green colouring matter, but the essential factor seems to be some vital principle, since the same vegetable or fruit juice which is useful in a fresh state becomes inert after prolonged boiling or desiccation.

In North Russia at the present day scurvy is endemic every winter, and I propose to give my experience of some 600 cases of this disease which I saw while I was Consulting Physician to the Forces in that country during 1919. I saw a large number of cases under treatment in the Russian civil hospitals both at Murmansk and Archangel, and at the former place I was told by Dr Rabin, Port Medical Officer, that the favourite treatment is by the addition of two pints of fresh milk to the ordinary daily diet. The experiments of Chick, Hume, and Skelton, however, would seem to show that fresh milk is a food poor in the anti-scorbutic accessory factor.[5]

Among the British troops, scurvy of any severity was practically negligible. Four cases only were admitted to hospital and diagnosed, one in March, the other three in May 1919. It is probable, however, that the cases of debility with depression and discontent, which were found in considerable numbers at the end of the long winter, were due in part to a mild manifestation of this disease as well as to over-indulgence in alcohol. The rarity of scurvy among the Allied troops is largely to be explained by the inclusion in their dietary, from January 1919 onwards, of germinated peas and beans prepared as recommended by Dr Harriette Chick and Miss E. M. Hume.[6]

Causation:—In the Russian prisons at Archangel, scurvy appeared on a large scale in February 1919. Arrangements were made for admission of these scurvy cases to a special hospital established on Kegostroff Island in the spring. I am indebted to the admirable report of Captain A. J. Stevenson, R.A.M.C., the officer in charge of the hospital from June onwards, for details as to the relative incidence of various symptoms in 200 cases of which he made detailed histories.

The prison daily dietary had been since January 1918 till May 1919 as follows:—

Flour or biscuit	11 oz.
Rice, oatmeal, peas or beans	7¼ "
Frozen or tinned meat, or salt-herring	7¼ "
Bacon or pork	1¾ "
Tea	¼ "
Sugar	1 "
Salt	¾ "
Lime Juice (preserved)	½ "

All the prisoners admitted to hospital complained of not having had sufficient to eat in prison. The amount, especially as regards carbohydrates, appears to be too low when one takes into account the excessive cold of the northern winter. The entire absence of fresh food is noticeable, and the preserved lime-juice is apparently of little use save as an alkali. Further, all the meat and vegetables were boiled for about three hours. As a result, scurvy appeared in the prisons with great severity during February and March 1919, and new cases developed throughout the spring. It was found that the average period during which a man had been subjected to the above defective diet before he began to show signs of scurvy was 4·7 months. No doubt, the lack of exercise, the crowded prison, the depression engendered by bad surroundings, and the darkness of the long Arctic winter nights all contributed to this result. It may be noted that in Anson's expedition of the eighteenth century, where the pre-scorbutic period can be fixed with equal definiteness, the duration of the unfavourable conditions before scurvy appeared was six months. It was observed that the concurrence of other diseases, such as typhus, typhoid, influenza, and pneumonia, shortened the pre-scorbutic period so that some prisoners who had such illnesses developed scurvy, from one to three months after entering the prison. In general, the severer forms of scurvy, showing marked swelling of the gums, large muscle, joint, or subperiosteal hæmorrhages and great debility, were seen in the younger men, and these amounted to about 27 per cent. of the cases. (Fig 1.)

Symptoms.—The first sign was very commonly a purpuric rash on the legs, and with this the patient complained of weakness, loss of energy, and depression of spirits. Swollen and bleeding gums, swelling of the ankles, and pains in various parts such as the head, the chest, or the legs, were also early symptoms.

Over 80 per cent. developed sooner or later swelling of the gums, which were tender, bled easily, and often ulcerated. Very frequently large, soft, tender, tumour-like swellings developed on the palatal aspect of the upper alveolar margin, and filled up the palatal arch so as to make chewing very difficult (Fig. 3). In about half the cases there was a condition of severe gingivitis or even pyorrhœa, the teeth being loose and surrounded by pockets of pus; but this condition passed off as the general symptoms abated.

About 86 per cent. showed well-marked hæmorrhages, and these were usually on places subjected to pressure like the trochanter, elbow, shoulder, just above the popliteal space, or on sites where a blow had been received. Deep hæmorrhages

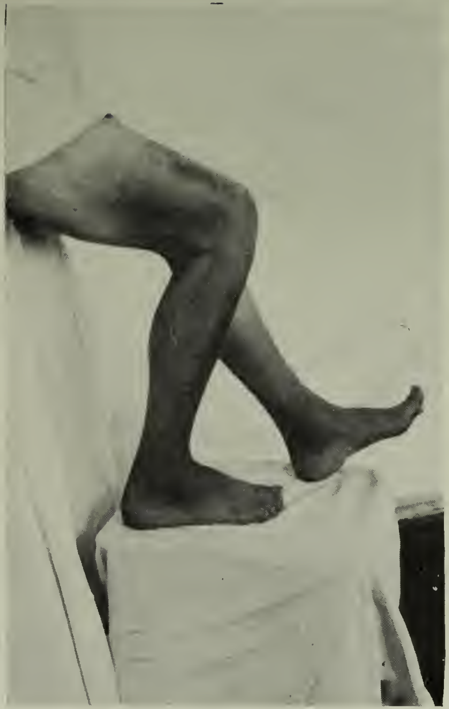

FIG. 1.

Large subcutaneous and muscle hæmorrhage right thigh and leg.

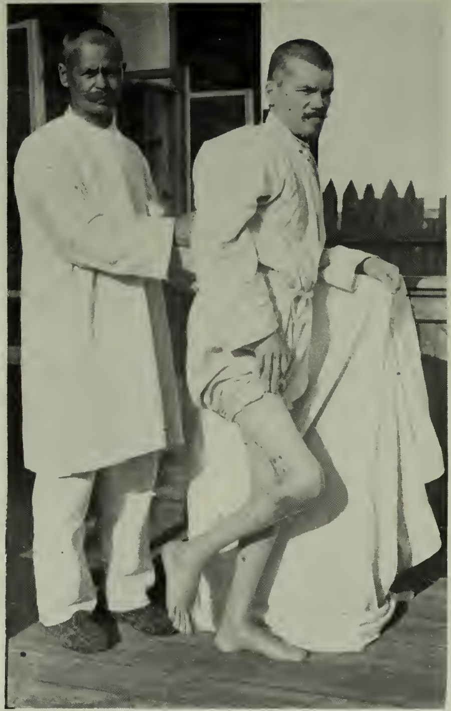

FIG. 2.

Small cutaneous hæmorrhages ; and contracture following hæmorrhage into right knee.

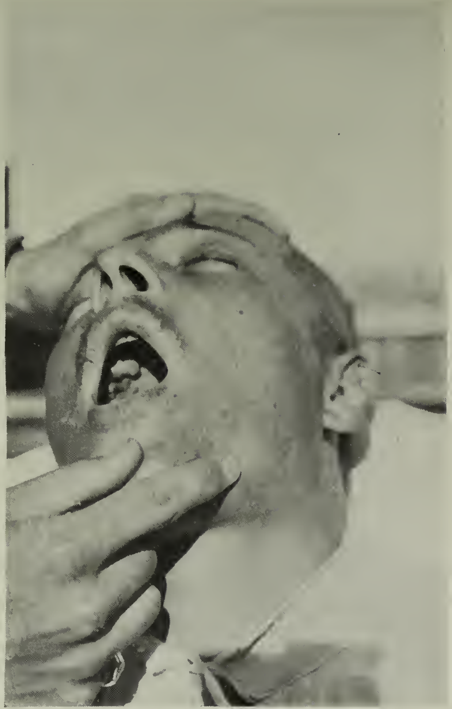

FIG. 3.

Scurvy gums with tumour-like palatal swellings.

in the muscles were found in over 50 per cent. of cases, usually in the legs, and they were accompanied by pain, tenderness on pressure, gave a feeling of woody hardness to the hand, and caused limitation in the movements of the limb concerned. Hæmorrhages into joints were somewhat difficult to distinguish with certainty from effusions of blood in the muscles and areolar tissues near the joint, but the actual joint (most commonly the knee) seemed to be affected in at least 10 per cent. of cases. Swelling of the joint, restricted movement, and tenderness when any attempt was made to move the affected limb were found, and this sign was the most persistent result of scurvy, the affected limb remaining stiff and contracted long after all blood had been absorbed and all other symptoms of scurvy had disappeared (Fig. 2). These joint affections were especially noted in the Russian civil hospitals. Subperiosteal hæmorrhages on the exposed parts of the ulna and tibia and on the back of the hand were noted in a few cases. When recovery was progressing, the muscle hæmorrhages were absorbed with striking rapidity, large black and hardened areas of 4 to 5 inches diameter resolving completely in two or three weeks. Hæmorrhages also occur in internal organs, and traces of partly absorbed blood were found on post-mortem examination beneath the parietal peritoneum, inside the bowel, into the pleura, in the meninges, and in the lung. In two cases there was bleeding from the bowel, in two from the urinary passages, and one had a cerebral hæmorrhage. When the hæmorrhage infiltrated the skin over a bony prominence like the trochanter or elbow or shin, or if any wound of such a devitalised area took place, an ulcer with raised edges was apt to form and to be very slow in healing.

The heart was always feeble, and in a considerable number of cases functional murmurs were audible. In cases where a post-mortem examination was performed, the cardiac muscle showed a striking degree of brown atrophy with great reduction in size of the ventricles. This and the large effusions sometimes found in the pleural cavities constitute the great risk for severe cases of scurvy, in which sudden death is very liable to occur. The blood-vessels in sections which were examined by Captain Stevenson showed no obvious changes.

The blood naturally attracted interest. Anæmia and great muscular wasting were obvious features of the severer cases, and there was a great deal of brownish pigmentation in the skin of dependent parts even where there had been no large hæmorrhages. A careful microscopic examination of the blood was made by Captain Stevenson in fifty cases of average severity, and the following table shows the average figures obtained by him :—

Red Cells	4,080,000	Polymorphs	45 p/c.
White Cells	7,510	Large lymphocytes	20 ,,
Hæmoglobin	55 p/c.	Small lymphocytes	29 ,,
Colour Index	·68	Eosinophiles	4 ,,
		Mononuclears	2 ,,

The characters were therefore those of a secondary anæmia with lymphocytosis. The coagulation time (average three and a half minutes) was not appreciably altered, and no special tendency to hæmorrhage from superficial wounds was noticed. There was slight diminution of the blood alkalinity (by Van Slyke's method).

With regard to the urine there was little abnormality. Albuminuria was observed five times only. In four cases only out of fifty was the urine alkaline. Hæmaturia was noted in three cases, one of these (a British soldier) having acute nephritis as well as symptoms of scurvy. No tube casts were found in any other cases.

Diagnosis.—The well-marked case is easy to diagnose by means of the hæmorrhages, the condition of the gums, and the general weakness and deterioration of health. But it is probable that isolated cases of less severity are often missed and regarded as debility of unknown origin, anæmia, rheumatic purpura, etc. In the present outbreak of scurvy, and probably in others, some cases which were regarded as typhus fever seemed afterwards to have been a combination of scurvy with one of the typhoid group, the rash of typhus and of scurvy being at first practically indistinguishable save for the fact that the minute scurvy hæmorrhages occur mainly on the legs and persist without fading for several weeks. Cases of mental depression and unexplained cardiac weakness with œdema and effusions into the serous cavities, when associated with a history of defective diet, should lead to a careful examination of the gums for swelling and of the legs for hæmorrhages. I have frequently seen cases in Scotland, especially in patients from mining districts, with a history of defective nutrition, which appeared to be cases of minor scurvy. These are very apt to pass through hospital unrecognised and diagnosed as "anæmia," "debility," "purpura," unexplained "hæmorrhage," etc.

Treatment.—This falls under the three heads of (*a*) preventive treatment; (*b*) curative treatment; and (*c*) treatment of symptoms.

(a) *Preventive.*—Want of exercise, low temperature, depressing circumstances, and the occurrence of infectious diseases, undoubtedly predispose to the onset of scurvy, but the determining factor appears to be certain dietetic defects. The defect is supplied by fresh fruit, fresh milk, fresh meat, potatoes, and green vegetables such as cabbage, which is specially favoured by the people of North Russia. When scurvy occurs, however, these articles are usually scarce or unobtainable, and the simplest effective method is to issue a ration of germinated peas or beans (5 to 8 ounces dry per diem). For germination the dry peas or beans are steeped in water for twenty-four to forty-eight hours, depending on the hardness, until the embryonic root begins to sprout; thereafter they are spread on a damp cloth and covered by another wet cloth for a further period of thirty-six hours or thereabout till the sprout is about half an inch long. They must then be lightly boiled with milk or water for a period not exceeding half an hour. Beans are much more difficult to soften and germinate than peas, and therefore less suitable than the latter. Lemons (4 ounces) or fresh lime-juice (1 ounce) are invaluable if obtainable, but the experience of the North Russian prisons, as well as the history of the subject, shows that lime-juice which has been preserved for several years is practically inert in preventing scurvy.

(b) *Curative.*—Among the Russians, milk, either fresh or soured by the action of the lactic acid bacilli naturally present in the atmosphere, is considered specially efficacious in treatment. The proved value of sour milk is interesting in connection with the habitual use by the Tartars of koumiss or kefir.

For purposes of comparison, forty-eight patients of about the same severity were taken at Kegostroff Hospital, divided into six groups of eight, lettered A, B, C, D, E and F, which were segregated from one another, and a different vitamine-containing food was added to the general diet of each group. The patients being under guard as prisoners, it was easy to ensure that the feeding conditions were faithfully adhered to during the six weeks over which the test lasted. The general diet consisted of bread, 12 ounces; oatmeal, 2 ounces; fat, 1 ounce;

frozen meat, 10 ounces, boiled for three hours; milk, 2 pints, boiled for one and a half hours; and ungerminated peas or beans, 8 ounces, boiled for three hours. For the purpose of the test each group of eight had this diet varied in a different particular. Thus to the diet of group A was added the juice squeezed from 4 ounces of fresh lemon; group B received 8 ounces of germinated peas, lightly boiled, instead of the same quantity of ungerminated peas; group C received 8 ounces of germinated instead of ungerminated beans; group D received 10 ounces of fresh underdone meat instead of well-boiled frozen meat; group E had an addition of 8 ounces tinned fruit; and for group F, 2 pints of unboiled soured milk replaced the well-boiled milk of the other groups.

After six weeks, improvement had occurred in all six groups. The improvement was judged both by general well-being and more precisely by the increase that had occurred in body-weight. Group F (soured milk) showed most marked improvement, having added over 14 per cent. to the original body-weight; groups D (fresh meat) and A (lemon juice) came next with an addition of between 10 and 11 per cent. each; group B (germinated peas) put on over 7 per cent.; and groups E (tinned fruit) and C (germinated beans) had an accession of between 6 and 7 per cent. each. The germinated beans had a tendency to cause diarrhœa probably by their hardness and indigestibility; hence, no doubt, their lowness in the scale.

(c) *Treatment of Symptoms.*—Mouth-washes of alum or of hydrogen peroxide were given to cleanse the mouth, and the gums were painted with salicylate of soda dissolved in alcohol or with tincture of iodine. For the absorption of the hæmorrhages in the early stages, painting with tincture of iodine, and later massage combined with hot water or vapour baths, were used. The contractures of the limbs often required prolonged treatment by massage and oil inunction. Tonics of iron, arsenic, and strychnine were necessary to improve the appetite and the general health. Ulcers were treated by mild antiseptic dressings.

Summary.—Scurvy is endemic in North Russia, and breaks out every year towards the end of the winter among the poorer classes of the population.

While various factors predispose to its occurrence, the determining condition is a vitamine-deficient diet taken over a period of four to six months. The onset is hastened by intercurrent infectious disease and other devitalising influences.

If fresh meat and fresh vegetables be scarce, the simplest anti-scorbutic diet consists of germinated peas and beans, lightly cooked. Lime-juice which had been preserved and kept a long time was found to have little, if any, value in the prevention of scurvy.

Among the additions to the diet of prisoners suffering from scurvy, which were found to be of greatest curative efficacy, came in order of value—soured milk, fresh meat, fresh lemon juice, germinated peas, tinned fruit, and germinated beans.

Cases of scurvy recover with great rapidity in favourable circumstances and with proper diet; almost every case loses all symptoms within one month, except as regards the contractures produced by the hæmorrhages, which may require prolonged treatment.

The chief danger is from sudden failure of the heart, which undergoes brown atrophy in the general wasting and may be embarrassed by excessive pleural effusions.

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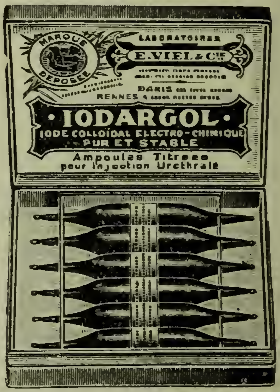
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The Prescriber.

Vol. XVI. Edinburgh, April 1922. No. 187.

CHLOROPHYLL AND HAEMOGLOBIN.

THE exact part played by iron in the animal economy is difficult to determine. It is essential to the formation of blood, yet its percentage in the haemoglobin molecule is very small. The chlorophyll of plants, on the other hand, contains no iron, though it appears that magnesium is an essential ingredient in its molecule. And yet it has been shown beyond doubt that iron is essential to the formation of chlorophyll, for when this element is excluded from a plant's nourishment the plant becomes pale and sickly owing to the non-formation of chlorophyll. Physiologically chlorophyll plays much the same part in the respiration of the plant as haemoglobin plays in that of the animal.

The value of green vegetables in the maintenance of human health is beyond question, and various hypotheses have been advanced to explain their function. The presence of chemical salts ; the electric content of living cells, which disappears when vegetables are desiccated ; the more recent hypothesis of vitamins or accessory food factors—these have all been put forward by way of explanation. More recently, however, the work of several Continental observers, carried on for some years past, has seen the light, and a chemical relationship between chlorophyll and haemoglobin has been determined, an announcement which has been received with interest and enthusiasm by scientific men the world over.

These researches were described in full by Dr M. O. Forster in his Presidential Address to the Section on Chemistry, at the recent meeting of the British Association in Edinburgh. They are also dealt with in a work by Dr David Burns, entitled 'An Introduction to Biophysics,' published recently by Messrs Churchill. Although the difference between haemoglobin and chlorophyll as such is a fundamental one, there is a link which connects both. Acted on by suitable reagents, chlorophyll passes through several stages to aetioporphyrin, a substance which may also be formed from haemoglobin, through haemin and haemoporphyrin. In the earlier stages of the process magnesium seems to play the same important part in the molecule of chlorophyll and its derivatives, as iron does in those of haemoglobin.

Professor Emil Bürgi, of Berne, has shown that phylloporphyrin ($C_{16}H_{18}N_2O$), a decomposition product of chlorophyll, is very closely related in chemical structure to haematoporphyrin ($C_{16}H_{18}N_2O_3$), an iron-free derivative of haemoglobin; also that haemopyrrol ($C_6H_{13}N$) can be prepared from both. Bürgi deduces from this that chlorophyll ought to be readily transformable into blood-forming compounds in the human body.

Bürgi has isolated pure chlorophyll from green vegetables in the form of an extract termed *Phyllosan*, which represents in concentrated form a considerable quantity of green stuff. It is a dark green powder with scarcely any taste, and at present is sent out in the form of tablets representing about 5 grains each. Clinical experiments would seem to demonstrate beyond a doubt the accuracy of his theory, for results are claimed for the product which show that its effects in anaemia are in every way equal to those of preparations of iron.

That the suggestion of a relationship between chlorophyll and haemoglobin has been well received is no cause for surprise. The idea is fascinating, and the analogy in function of the two substances has been apparent ever since the study of comparative physiology began. Now that this relationship has been definitely established one can see endless possibilities. Not only does it dignify the use of green vegetables by transferring it to the domain of therapeutics, but it throws some doubt on the credentials of those intangible factors represented by the 'blessed word' vitamins. Further pursuit of the subject may reveal that there is more in *colour* than one at first surmises. If the green of spinach and the red of ham and beef are so closely related, may there not be some similar affinity between the deep yellow of the egg, the rich brown of chocolate, the brilliant scarlet of the tomato, and the variegated hues of some of the liquids that delight the heart of man? It has been declared that coloured foods are richest in 'vitamins': perhaps chemistry will now step in and show the relationship of all of these to the body fluids through the presence of interchangeable chemical compounds.

RADIUM THERAPY.

THE Radium Institute of London has issued its Report for 1921, which appears under the authorship of Mr A. E. Hayward Pinch, F.R.C.S., Medical Superintendent of the Institute. It is as usual an interesting document, and affords an excellent résumé of the progress of this department of therapeutics. During the year 801 cases were presented (of which 57 were examined but not treated), and 7539 treatments were administered, of which 4075 were given free to necessitous patients. These treatments include a great variety of diseases, a classified summary of which appears at the beginning of the Report.

It is worthy of note that certain cases are not amenable to radium treatment. It is useless in all cases of disease affecting bone substance; it is of little value in cystic conditions; and it has no effect whatever on fatty tumours. These disqualifications would appear to have led to the statements recently made in the lay press to the effect that radium had proved a failure. Mr Pinch emphatically states that radium is not a failure when used intelligently and scientifically, and when applied to the treatment of those conditions which experience has shown are amenable to its action. He does not claim that it is a panacea, or a cure for malignant disease, and he admits that much more work must be done before it will be justifiable to use the word 'cure' even in selected cases of malignant trouble. The expression 'arrest of the disease' may, however, be truthfully employed in many instances.

The employment of radium emanation as a therapeutic agent is steadily increasing, and its field of usefulness broadens from day to day as its merits and advantages become more widely recognized. It may be employed by inhalation, by ingestion dissolved in water, or by inclusion—this last method consisting in the application of the emanation in tubes or containers for radiation of diseased tissues in the same way as radium salts are applied.

The main part of the Report is devoted to the use of radium in diseases of women, and much interesting and useful information is detailed. Reports from the Research Department and the Chemico-Physical Laboratory appear as appendices. A perusal of the Report leads to the conclusion that in radium we have a therapeutic agent of distinct, indeed of great, value ; that the necessity for its intelligent and scientific use is more than ever apparent ; and that much research and experiment are necessary to develop its possibilities.

A contribution to this necessary research has been made by the Medical Research Council and is described in a Special Report just issued.[1] In 1919 the Ministry of Munitions handed over to the (then) Medical Research Committee some five grammes of radium bromide, collected from innumerable gun-sights, watch dials, and other instruments of war, which was thus made available for research work. Inquiries were then begun to determine the curative value in malignant disease of penetrating radiation of extremely short wave-length, like that of the *gamma* rays of radium, with a view to ascertaining whether the use of this very large amount of radium would give results different in kind or degree from those obtained with minute quantities.

The Report is made up of six separate chapters, in which the effects of the *gamma* rays are discussed from various points of view, such as the treatment of malignant disease and the histological changes produced in the tissues of man and animals ; the effects on the bone marrow of exposure to 5 gm. of radium bromide are also dealt with, as also the range of *beta* rays in different metals. It was found that the majority of malignant growths exhibit a high degree of resistance to the radiation, while the skin reactions, which are variable, are sometimes very severe. There is also a general reaction in the form of malaise, and occasionally a marked oedema. The authors are of opinion that in the treatment of malignant disease the collaborate work of physician, surgeon, radiologist, and pathologist is very necessary. The other researches are more purely scientific but no less valuable, and the Report reflects great credit on those responsible for the research.

---

[1] *Medical Uses of Radium : Studies of the Effects of Gamma Rays from a large quantity of Radium.* By various authors. Special Report Series, No. 62. (H.M. Stationery Office. 5s.)

ORIGINAL COMMUNICATION.

Therapeutics in the Making: An Outline of its History.

By John D. Comrie, M.A., B.Sc., M.D., F.R.C.P.

Lecturer on History of Medicine at the University of Edinburgh; late Consulting Physician to the Forces in North Russia.

PRIMITIVE man, ignorant of the properties of the material world about him, finds it simpler to rely upon mental processes in the treatment of disease, and primitive medicine is therefore largely of a theurgic nature. In the cradle of recorded civilization, the Euphrates valley, there developed many thousand years ago a healing art, partly magical and partly dependent on material agents, which is recorded in the cuneiform tablet library of Assur-bani-pal found in the ruins of Nineveh. In Egypt, too, remedies which we know and use to-day were employed along with 'words of power' and amulets. Among the last, one of the most interesting is the 'eye of Horus,' a sign of good omen placed on writings, prescriptions, or other articles which it was desired to bring under the protection of Horus, the god of the noonday sun, of good fortune, and of healing, and which persists, almost unchanged in form, as the ℞ with which the prescriber of the present day automatically begins to write his formula.

The period of the XVIII Dynasty, about 1500 B.C., was that of Egypt's zenith, and from this epoch numerous surgical instruments and a book of medical prescriptions, the 'Ebers Papyrus,' have come down. Though in this work many of the substances prescribed cannot be identified, enough are recognizable to show that the list of physical remedies was a very efficient one. Among the substances employed were—various salts of lead as astringents; pomegranate and acanthus pith as vermifuges; sulphate of copper; magnesia, lime, soda, iron, nitre; oxide of antimony; sulphide of mercury; many volatile oils such as those of peppermint, fennel, cassia, juniper, cedarwood, and turpentine; gentian and other bitters; mandrake, hyoscyamus, opium, and other hypnotics; linseed, castor oil, squills, frankincense, myrrh, and yeast. Among the methods of operation and external application the Egyptian doctors used the knife, cautery, massage, ointments, plasters, poultices, suppositories, enemata, inhalations, the douche, and vaginal fumigation.

To this well-developed medicine the Greeks in their maritime excursions fell heir, and in Homeric times (1000 B.C.) they regarded with superstitious reverence the practitioners of Egypt 'where each is a physician, skilled beyond all human kind.' The Greeks of a later date, however, became still more successful as practitioners, and developed medicine especially along the lines of nature cures, suggestion treatment, and surgery. In the time of Hippocrates (400 B.C.) surgical procedures, employed for example in operations on the head, in the reduction of dislocations, and in the treatment of compound fractures, reached an extraordinarily high level of technique and success. Natural modes of healing were cultivated to a great degree at salubrious health resorts, where the shrines of Asklepios and the medical schools or guilds also were located. To these places, such as Epidauros, Cos, Crotona, and Cnidos, the phthisical, the asthmatic, soldiers recovering from discharging wounds, and persons broken down in health or troubled by functional disorders betook themselves in numbers whose magnitude is attested by the fact that at Epidauros the open-air theatre could seat 12,000 spectators and the stadium for games could accommodate many more. Here amid cheerful open-air surroundings, well fed and cared for, the phthisical could recover strength, the hypochondriac could forget his complaints, and the ailing develop new vigour. No wonder that Pausanias, meeting a stranger from Sidon in the temple precincts at Epidauros and falling into a discussion as to the nature of the gods, declared his belief that Apollo was the sunshine and Asklepios the fresh air. Suggestion treatment, too, was very effectively carried out in the case of impressionable invalids, who, after sacrificing to Asklepios, laid their couch by night in the abaton of the temple, hoping that Asklepios would in dreams reveal the nature of the treatment to be followed. The absurd lengths to which this practice was apt to be carried, and the rôle of the priest in representing Asklepios, are amusingly satirised by Aristophanes in the contemporary comedy of 'Pluto.' Apart from this, however, the mind of the Greek in the age of Pericles and Socrates was essentially rational and material in its outlook on medicine, and we find Hippocrates urging that no disease, not even the puzzling epilepsy, is to be regarded as more directly an infliction from the gods than any other. As an example of the practical nature of Greek medicine the treatment prescribed by Hippocrates for pneumonia may be given. The diet was of barley water or ptisan, with honey in water to relieve thirst; for the pain of the accompanying pleurisy, hot water in a brazen or earthenware vessel was applied to the side, separated from the skin by a sponge, or fomentations of toasted salt or millet or of boiled bran were applied in woollen bags or bladders; wines of various kinds might be used as required; in diaphragmatic pleurisy, purging by black hellebore, mixed with cumin, asafoetida, or other aromatic herbs, was recommended; when the patient was plethoric, blood should be cautiously drawn from the arm; if the patient liked the bath, a hot bath once or twice daily, into which the patient was lifted and in which water was poured upon him and sponges used, was beneficial; finally care was to be taken that the patient was not disturbed nor any change in treatment made about the time of crisis.

The Greeks of this early period had not a great materia medica, and most of the drugs employed were violent in action. Thus Alexander the Great, who among his literary and social talents had a great love for amateur doctoring, on one occasion (330 B.C.) wrote to one of his principal medical officers warning him of the dangers of hellebore, which was then a commonly used purgative. During the early days of the Roman Empire, however, the knowledge of drugs was greatly widened. Scribonius Largus, who was one of the medical officers in the expedition of the Emperor Claudius to Britain in 43 A.D., left a book of receipts for various diseases much after the style of modern prescribing manuals. The elder Pliny in his encyclopaedic 'Natural History' has collected information about a great variety of drugs and recorded such interesting details as the experiments of Mithridates on the production of immunity against poisons. Above all to Dioscorides, who lived about 100 A.D., we owe the knowledge of ancient materia medica. He wrote an elaborate account of the substances used in dietetics and therapeutics, their collection and preparation. The beautifully illustrated MS. of his work copied in the 5th century for the Empress Juliana Anicia is still preserved in the Royal Library of Vienna. This is the basis of our modern materia medica. Galen (130-200 A.D.), whose writings on almost every branch of medicine formed the great work of reference for about twelve hundred years after his death, composed two elaborate treatises on 'Therapeutics' and on 'The Compounding and Action of the Simple Drugs.' It does not seem to have occurred to any of these writers, or perhaps it was then impossible of achievement, that if drugs were prepared in a standard fashion, dosage was a matter of exactitude. We find, therefore, that the signature of their prescriptions usually directs a cyathus or a bolus 'the size of a nut,' or some such vague measure, to be taken. Dosage did not become a very definite matter till the early 19th century.

During the Middle Ages little that was new was added to the art of healing in Western Europe, and even the medicine of the ancients was largely forgotten. In the monasteries, medical manuscripts were preserved and sometimes studied; and each religious foundation at least had its little physic garden where simple herbs were grown for the treatment in sickness of the neighbouring community. Since medical practice was largely in the hands of the Church, healing by faith gradually attained more and more importance. The touch of a saint in life, or a fragment of his body after death, was regarded as of sovereign value in curing disease; and the efforts of the modern psycho-analyst to dispel his patient's gloom would have been as a flickering rush-light compared with the awful splendour of a confessional whose powers to loose from disease and sin on earth were believed to be ratified in heaven. That the type of case suited for this kind of psychic treatment was clearly recognized is well seen in representations by Donatello, Titian, Rubens, and other great artists showing various saints practising exorcism. From this claim by the Church to heal disease as well as to remit sins, arose indirectly a curious superstition. The kings, both of France and of England, who were supposed to rule by divine right, also claimed to cure disease by laying on of hands. Gradually the process of 'touching' narrowed down to the cure of scrofula or 'king's evil'; but the extent to which this was practised may be judged from the fact that, even as late as the 17th century, in a reign of 25 years, Charles II. 'touched' over 200,000 persons suffering from this disease.

The alchemists preserved much of the ancient knowledge in regard to drugs, and later adopted and introduced in the West many of the discoveries made by the Moslem peoples. Their practical value and their comprehensibility were, however, much lessened by an admixture of superstition, doctrines of 'sympathy' and 'signatures,' astrological observances, and frequently by imposition on credulity. In the 16th century, however, Paracelsus, their greatest representative, made notable additions to the art of healing, especially by introducing various metallic salts and mineral baths. Glauber (1604-1688), although he dealt largely in secret remedies, discovered sodium sulphate and introduced into medicine many useful chemical substances. He may be called the last of the alchemists or the first of the modern chemists.

In the East during the Middle Ages the state of medicine was much more practical and rational. In 'The Talisman' Sir Walter Scott has drawn a very fair picture of the contrast between Western and Eastern medicine. The Moslem conquerors of Persia, Syria, and Africa established commercial intercourse throughout the Mohammedan world from India to Spain, and at the same time they cherished the ancient learning of the peoples they subdued. Thus the old medicine of the Greeks was not only kept alive but amplified, and many new drugs were brought into Europe from the East. Among the gains of Western therapeutics from this source may be mentioned such drugs as arsenic, oxide of zinc, camphor, cloves, cubebs, sandalwood, sugar, senna, rhubarb, gums, formic acid, musk, bezoar stone, the various volatile oils, and the reintroduction of such chemical processes as the preparation of acids, distillation of alcohol, and solution of active remedies in syrup. Another feature which originated in the East though it attained its full development later in Europe as a therapeutic institution, was the charitable hospital. Large hospital foundations for the treatment of the sick poor had been established by Moslem rulers at Damascus, Cairo, Baghdad, Cordova, and other places. This idea, so eminently adapted to the spirit of Christianity, was copied by Louis IX. and Pope Innocent III., so that by the end of the 13th century, as Virchow concludes, nearly every town in Europe of 5000 inhabitants had a charitable hospital. The idea of teaching students at the bedside in these hospitals was a subsequent development in the 16th and 17th centuries, and led to greater uniformity and diffusion of therapeutic knowledge.

These hospitals made lists of the drugs and compounds that they used, known as pharmacopoeias, but the first official pharmacopoeia in Britain was that drawn up by the Royal College of Physicians in London at the instigation of James I. in 1618 and founded on the Pharmacopoeia of Mesuë from Baghdad. It was followed by the Pharmacopoeia of the

Edinburgh College in 1699. A curious feature of these early pharmacopoeias was the inclusion of many remedies which at first sight appear either disgusting or ineffective. Some of these, like unicorn's horn, may be explained as a reflex of and concession to the popular medicine of the period. Others can be explained in the light of a fuller modern knowledge ; for example, 'the skin of toads slowly dried in an earthen pot' has been shown to contain a powerful alkaloid of the digitalis group ; and urine, a favourite remedy, is well known to have a great stimulating action upon chronic ulcers and other epithelial tissues. Still others of these drugs were introduced through misconception ; for example, powdered mummy, which was very largely prescribed, represented the 'bitumen' used in the East for various complaints and designated by the same word as that for a corpse embalmed by its aid. Certainly the more enlightened type of practitioner did not use these remedies, and Sydenham quaintly remarks *à propos* of the use of human skull as a remedy for epilepsy, 'I see not why (if there be such specifick virtue in a humane skull) there should not be enough in the patient's own, which is so closely applied to ye brain, ye part affected in this disease ; but there must needs be recourse to another man's skull, and ye same dead.'

(*To be continued.*)

THERAPEUTIC PROGRESS.

ABSTRACT REVIEWS OF CURRENT LITERATURE.

ANAESTHESIA.

Ether.—W. Webster,[1] anaesthetist to the Winnipeg General Hospital, gives an account of his experience with the Cotton process ether and with ethanesal (see PRESCR., Feb. 1922, p. 36). When Cotton's ether was given by the open method, he found to his disappointment that the induction period was on the average longer than with the other ethers. The excitement period was considerably prolonged. With the closed method the results were about the same as with other ethers, including post-operative vomiting and the time of regaining consciousness. Ethanesal proved to be less irritating to the respiratory passages than ordinary ether ; the breathing is quieter, the aftertaste less persistent and less unpleasant, and the salivation less. The stages of anaesthesia are the same as with ether, but a little shorter. The pulse rate is less, and the blood pressure is not lowered to the same extent. Muscular relaxation is greater. The quantity of ethanesal required is about two-thirds that of ether. Vomiting is generally less.

Ethanesal requires some practice in administration, the tendency being to keep the patient more deeply under the anaesthetic than is necessary. If not kept under too deeply, patients wake up more rapidly than after ether. Webster regards these researches as of the utmost importance, and expresses a hope that they will be carried further in the effort to provide ultimately the perfect anaesthetic.

F. Momburg[2] reports satisfactory results in 170 cases from the intravenous use of ether. He regards it as an ideal form of narcosis, and believes that such untoward results as have been reported must be due to faulty technique. The patients go under quietly, the anaesthesia is calm and pleasant, and the patients look fresh when they recover consciousness.

T. Reitz[3] has made a number of observations on the tremor sometimes seen during ether anaesthesia, which he attributes to cerebral excitation caused by the circulation of ether in the blood. He found that pressure on the carotid stopped the tremor immediately in 19 cases out of 33. In five cases the tremor was imperfectly stopped, and in others the pressure was without effect. Pressure must be strong, and sometimes bilateral.

The value of ether anaesthesia in delaying the action of the toxin of *Bacillus botulinus* has suggested to J. Bronfenbrenner and H. Weiss[4] the possibility of its use in the treatment of botulism. In the course of experiments on guinea-pigs inoculated with botulinus toxin they observed that death was greatly delayed in those animals which had been anaesthetized with ether. They found further that if an animal were inoculated with a large quantity of toxin, and if after six hours, when dyspnoea was evident, antitoxin were injected intravenously, the animal died; if, however, the animal were under ether anaesthesia when the antitoxin was injected, and kept so for some time, it survived. Ether anaesthesia appeared to cause delay in fixation of toxin by the tissues, thus allowing the antitoxin time to act. Owing to the difficulty of applying ether anaesthesia by inhalation in cases of human botulism, the authors suggest rectal administration of ether in oil as more suitable. They further suggest that as etherization is known to counteract the tendency to anaphylactic shock, it should be possible to administer large doses of toxin without fear of this complication. The report is a preliminary one, and the authors announce that they are engaged on further experiments, including the use of luminal followed by ether.

References.—1. *Canad. Med. Assoc. J.*, Jan. 1922, p. 15. 2. *Deut. med. Woch.*, Oct. 13, 1921, p. 1228. 3. *Bull. Soc. de biol.*, Dec. 17, 1921. 4. *Jour. Amer. Med. Assoc.*, June 18, 1921, p. 1741.

Ethyl Chloride.—Ley[1] reports on the value of ethyl chloride as a general anaesthetic. In the hands of an experienced anaesthetist it is free from danger. Examination of the heart is necessary, and it is desirable in the majority of cases to give a preliminary injection of morphine and atropine. In the case of anxious patients bromural is a useful adjuvant. In chlorotic nervous patients with a tendency to vomiting, nausea may be prevented by the previous administration of 4 gm. (60 grains) of sodium bicarbonate.

REFERENCE.—1. *Zentralb. f. Chir.*, Oct. 15, 1921.

Local.—The new local anaesthetic, *Butyn*, originally known as 'Anaesthetic-H' (see PRESCR., Oct. 1921, p. 362), is on the market, and appears to have emerged with credit from its preliminary investigation. It has been examined by a committee appointed by the American Medical Association, and as a result of their report the Association have included it in their list of approved remedies.[1]

Butyn is para-amino-benzoyl-dibutyl-amino-propanol sulphate, $[NH_2.C_6H_4.COO(CH_2)_3.N(C_4H_9)_2]_2.H_2SO_4$. It is the normal sulphate of a base resembling that of novocain, with this difference, that butyn possesses a butyl group in place of the ethyl group, and a propanol group in place of the ethanol group. Butyn is a colourless, odourless solid, which rapidly produces a sense of numbness when placed on the tongue. It is soluble in less than its own weight of water at 20° C. (68° F.), dissolving slowly in cold, but rapidly in hot water. It is very soluble in warm alcohol and in acetone, slightly soluble in chloroform, insoluble in ether. Alkalis added to the aqueous solution precipitate the free base as a colourless oil; when the separated base is exactly neutralized with hydrochloric acid the white hydrochloride crystallizes out. The aqueous solution gives a white precipitate with potassium mercuric iodide; a brown precipitate with iodine and with gold chloride; and a yellow precipitate with picric acid. It is distinguished from novocain by its giving the white precipitate with barium chloride characteristic of a sulphate. It may be distinguished from holocain (phenacaine) in the following manner: Dissolve 0·1 gm. of butyn in 5 c.c. of water, add 2 drops of dilute HCl and 2 drops of sodium nitrite solution (10 per cent.), and mix with a solution of 0·2 gm. betanaphthol in 10 c.c. NaOH (10 per cent.). Butyn gives a scarlet red precipitate, while holocain gives a white precipitate. To distinguish from cocaine, add to the aqueous solution of butyn (1 : 50 as above) 3 drops dilute H_2SO_4 and mix with 5 drops potassium permanganate solution. In the case of butyn the violet colour of the latter disappears immediately.

As a local anaesthetic butyn may take the place of cocaine in surface anaesthesia, as for eye, nose, and throat. Its solutions are non-irritant and it acts through intact mucosae almost as effectively as cocaine. On the normal human eye, a 0·5 per cent. solution of butyn is less effective than a one per cent. solution of holocain, but more so than a one per cent. solution of cocaine. Its toxicity is somewhat greater than novocain, consequently it is not so suitable for injection or spinal anaesthesia; but its more prompt absorption renders it eminently suitable for eye work, as it can be used in weaker solution.

A. E. Bulson[2] reports on behalf of the committee referred to above. They conclude that butyn is more powerful than cocaine, a smaller quantity being required; that it acts more rapidly and its action is more prolonged; that in the quantity required it is less toxic than cocaine (according to their experience to date); that it produces no drying effect on the tissues and no change in the size of the pupil; that it has no ischaemic effect and therefore causes no shrinking of tissues; and, finally, that it can be boiled without impairing its anaesthetic efficiency.

M. L. Bonar and T. Sollmann[3] report on several new local anaesthetics of allied composition, — anaesthetics 'G,' 'H' (butyn), and 'III.' Their opinion is distinctly in favour of "H," or butyn, which has advantages over both the others and promises well, they think, as a local anaesthetic for eye work.

The question of acidosis in surgical anaesthesia is discussed by M. E. Rose,[4] who made a number of experiments to determine whether novocain produces a decrease in the alkali reserve of the blood. Thirty-eight surgical patients were observed. A 0·5 per cent. solution of novocain with adrenalin, 4 drops of 1 : 1000 solution to the ounce, was used as the anaesthetic in all cases. Twenty-two patients, or 58 per cent., showed no decrease in the blood bicarbonate after operation. Sixteen, or 42 per cent., showed a decrease varying from 1·5 to 10 volumes per cent., the average decrease being 4·5 volumes per cent. Over all cases the average fall was 1·9 volumes per cent.

REFERENCES.—1. *Jour. Amer. Med. Assoc.*, Feb. 11, 1922, p. 431. 2. *J.A.M.A.*, Feb. 4, 1922, p. 343. 3. *J. Pharm. and Exper. Therap.*, Jan. 1922, p. 467. 4. *Illinois Med. Jour.*, Jan. 1922, p. 6.

Scopolamine-Morphine.—H. M. Gerson[1] contributes notes on 75 cases in which 'twilight sleep' was used in childbirth. The first dose was $\frac{1}{150}$ grain scopolamine (hyoscine) and $\frac{1}{3}$ grain morphine. After an hour $\frac{1}{150}$ grain scopolamine was given alone. True amnesia did not occur for a further three-quarters of an hour. At first various memory tests were used, but later the recognition of amnesia was instinctive. The percentage of complete amnesia in primiparae is very high in comparison with multiparae. Emergence from this state indicates a repetition of morphine ($\frac{1}{4}$ grain), which restores complete amnesia, but at the sacrifice of some intensity of uterine contraction. This in turn is regained by the use of pituitary extract.

The main objection to the method is its effect on the child. Oligopnoea occurs more frequently than in unaided labour, though in no case was death attributed to it. It is more frequent in labours of short duration. Vigilance is necessary till the child gives a healthy cry. In no case was there any appreciable haemorrhage, nor any complications. Tables are given showing full statistics of the 75 cases.

W. M. J. Schellekens[2] vigorously denounces the 'twilight sleep' method, and indeed any form of general anaesthesia in labour, as dangerous for the child. He has had favourable experience with sacral anaesthesia in 8 cases. In all the cases the sensibility was materially reduced, and although the contractions of the uterus were felt, it was merely a dull sensation of pressure, even when the skull was passing, not a sensation of pain. He followed the epidural injection method, injecting 20 c.c. of a 2 per cent. solution of novocain, with a little adrenalin, through the sacral opening. His patients lay on the right side, the knees drawn up as high as possible, the lumbar region on the edge of the bed. The multiparae were emphatic in their appreciation of the painless course of the delivery. The difficulty is to know when to make the injection. The tendency is for it to be applied too early with the primiparae and too late with the multiparae. He gave a second injection (10 c.c.) in 2 cases. Not the slightest effect on the child could be detected. The effect of the anaesthetic is felt in from 10 to 20 minutes.

W. S. van Leuwen and A. von S. Gyorgy[3] report on some experiments made on monkeys to ascertain the effects of scopolamine and morphine, these animals approaching more closely to human beings. They found that while monkeys were sensitive to morphine in doses of from 5 to 10 mg. ($\frac{1}{10}$ to $\frac{1}{5}$ grain) subcutaneously, they were very insensitive to scopolamine, doses of 200 mg. (3 grains) subcutaneously having no visible effect. Scopolamine does not augment the action of morphine in monkeys.

REFERENCES.—1. *Lancet*, Mar. 4, 1922, p. 428. 2. *Nederl. Tijds. v. Geneesk.*, Oct. 22, 1921, p. 2060, per *J.A.M.A.* 3. *J. Pharm. and Exper. Therap.*, Jan. 1922, p. 449.

Spinal.—W. C. Stirling and C. S. Lawrence[1] give their experience of 40 operations in which spinal analgesia was employed. They conclude that if given by one experienced in its use it is relatively safe, but for operations above the costal margin it is less satisfactory than ether. In 36 cases there was complete loss of pain sensation; in four cases ether had to be given to finish the operation, on account of the nervousness of the patients and some pain. In no case were there any untoward symptoms. The drop in blood pressure necessitates its avoidance in cases of marked hypotension due to shock or haemorrhage. It is contraindicated also in advanced myocarditis, in intrathoracic and mediastinal growths, in ascites and pleural effusion, and in children. It is useful in urological surgery and in conditions associated with hyperthyroidism.

R. Dumas[2] recommends the spinal method as the best for operations in the pelvis, especially in cases of obesity, insufficiency of liver or kidney, and with lung disease. It is contraindicated in shock of any kind, from haemorrhage, infection, or weakness, as such patients cannot stand the intense drop in pressure that follows intraspinal injection. Aside from these conditions it is a most valuable method, requiring no anaesthetist, and leaving intact the lungs, liver, and kidney.

REFERENCES.—1. *Urolog. and Cutan. Rev.*, Feb. 1922, p. 67. 2. *Bulletin méd.*, Jan. 11, 1922, p. 22.

Synergistic Analgesia.—This method of inducing anaesthesia was described in The Prescriber, May 1921, p. 195. It depends on the principle of reciprocal augmentation of the action of one drug by that of another. A very small amount of ether, or of nitrous oxide and oxygen, insufficient in itself to produce anaesthesia, can be reinforced by the previous injection of a small amount of magnesium sulphate, profound anaesthesia being produced. A brief summary of recent contributions on the subject appeared in our February issue, p. 36.

J. T. Gwathmey and J. Greenough[1] now describe in full the technique of this method, using nitrous oxide and oxygen as the anaesthetic. Two soapsuds enemata, one hour apart, are given the night before the operation. A tapwater enema is given early the next morning. Two hours before the operation a chloretone suppository (15 grains) is given. Half an hour later a breast hypodermoclysis is given of 300-400 c.c. of a sterile and chemically pure solution of magnesium sulphate (4 per cent.) at a temperature of 110° F. The whole procedure should be done aseptically, the solution running in by gravity in not less than thirty minutes. A towel is placed over the face and every inducement offered for sleep. The first hypodermic of morphine ($\frac{1}{8}$ grain) is given an hour and a half before the time set for the operation. This is repeated at intervals of 15-20 minutes until the full amount is given, the average adult dose being $\frac{3}{8}$ grain. Then the anaesthetic mask is applied and oxygen started at the same time as the nitrous oxide. At no time should the patient be cyanosed o any attempt made to induce the usual signs of anaesthesia. The appearance of the patient is better than when the gases alone are used, and shock has been invariably absent; wound pain is a thing of the past, the patients being comfortable for 15 to 30 hours after the operation with no nausea, and with a normal pulse and respiration.

J. M. Rector[2] reports on his experience of Gwathmey's method in operative gynaecology. He used a smaller amount of a stronger solution of magnesium sulphate (20-30 c.c. of a 25 per cent. solution), and his anaesthetic was ether, alone or in combination such as chloroform ʒi, ether ℥iii, or chloroform 2 c.c., ether 96 c.c., ethyl chloride 22 c.c., oil of orange 0·5 c.c. Shortly before operation an injection of morphine was usually given. His cases were grouped, the exact method being different for each group. He is convinced that this method is a vast improvement over the present form of anaesthesia. The nature of the case, he thinks, must determine the exact combination to be employed. In all cases the inhalation must be discontinued immediately upon the occurrence of muscular relaxation and loss of reflex sensation, and the inhalation must not be renewed until rigidity has reappeared.

S. J. Glass and H. S. Wallace[3] report on a combination of synergistic anaesthesia with preliminary alkaline treatment to prevent acidosis. Five years ago they inaugurated a routine treatment in which every patient received sodium bicarbonate, one gm. (15 grains), and lactose 0·3 gm. (5 grains) every four hours for six or eight doses before operation. On learning of Gwathmey's synergistic method they combined the two, using ether as the general anaesthetic, and the results have been very gratifying. Their technique consists of a preliminary alkaline treatment of sodium bicarbonate and lactose for several days before operation in order to have the patient thoroughly saturated with the carbonate. Immediate pre-operative treatment is essentially that of Gwathmey as already described. Comparison of his tables reveals the following advantageous results: The synergistic effect of magnesium sulphate prolongs the sedative action. There is very little paresis of the intestine, and less acidosis and nausea, with vomiting practically eliminated except in gall-bladder operations. Less ether is necessary; this reduces bronchial and renal irritation, and causes less acidosis. Distension and gas pain are absent, and there have been no deleterious results. With the alkaline synergistic method the postoperative condition is entirely altered. Absence of pain and distension, and subsequent improved appetite and lessened mental depression, make convalescence shorter and more agreeable.

REFERENCES.—1. *Med. Record,* Oct. 1, 1921. 2. *Ibid.*, Feb. 11, 1922, p. 230. 3. *Jour. Amer. Med. Assoc.*, Jan. 7, 1922, p. 24.

ARTHRITIS.

In an article on chronic arthritis, L. W. Ely, of San Francisco,[1] classifies the disease, dividing it into two main types. The first type includes the frank infections—tuberculosis, syphilis, typhoid, pneumococcus, coccidioidal granuloma, and diplo-streptococcic arthritis from infection in the tonsil, in the deep urethra, and possibly in other organs as well. It includes Still's disease, and that form of multi-articular inflammation described by various writers as proliferative arthritis, atrophic arthritis, rheumatoid arthritis, etc. The fundamental pathological lesion of this type is a proliferative inflammation in the synovial membrane, in the bone marrow, or in both. It results in complete recovery, or in a fibrous or bony ankylosis. X-rays show rarefaction of the bone, thinning of the cartilage, and no new production of bone. The prime indication for treatment of this form of arthritis is to remove the cause when it can be found. Tonsils that give rise to suspicion should be removed. Those which most often give trouble are the tough, buried, fibrous tonsils in patients who perhaps have not had a tonsillitis for many years. Lesions in the deep urethra should be cleaned up. Often a vesiculotomy will be necessary. Antisyphilitic treatment will work wonders in appropriate cases.

The second type forms a well-defined, clinical, aetiological, and pathological entity, sharply differentiated from the preceding type. It is known also as arthritis deformans, as degenerative arthritis, as hypertrophic arthritis, as osteoarthritis, and as metabolic arthritis, senile arthritis, etc. It is the chronic rheumatism of the elderly, and, when occurring in the terminal interphalangeal joints, is known as Heberden's nodes, and is often erroneously considered a manifestation of gout. The first indication is to remove the focus of infection from about the roots of the teeth, where there is always evidence of alveolar infection. If this be done early the pain may subside entirely, and the joint may return to a state approaching normal, though it must always be remembered that the anatomical changes are permanent and will never disappear. Even in more advanced cases extraction of the teeth is usually followed by an improvement, and the patient may get along in comfort, but the distorted joint is always vulnerable to sprains, and will give trouble when it is used much. The pain is best treated by heat in some form, perhaps reinforced by hydrotherapy. Dry heat will usually give the best results. When the disease is in the joints of the extremities, the so-called Bier treatment, passive congestion, often makes the patient more comfortable. The author has seen patients improve after the injection of a foreign protein.

With regard to diet, Ely says that this is perhaps the most pathetic delusion in treatment. Diet has a real importance in the treatment of an arthritis caused by infection of the tonsil or at the roots of the teeth, for anything that disturbs digestion will naturally make the infection more active. Other than this, he says, diet plays no part.

In the February number of THE PRESCRIBER (p. 41) is given an abstract of a communication by Dufour relative to treatment of gonococcal arthritis by injection of fluid taken from a diseased joint. This author[2] now describes three more cases so treated. Fluid is taken by puncture, it being immaterial whether this fluid contains pus or gonococci, and from 10 to 20 c.c. injected in the thigh, the injection being repeated as often as puncture is required. In all six cases cure was effected in a period varying from four to thirty days. The treatment is harmless: the fluid acts as a vaccine and its action is prompt.

REFERENCES.—1. *Med. Record*, Feb. 11, 1922, p. 223. 2. *Bull. Soc. méd. hôp.*, Nov. 23, 1921, p. 1558.

CANCER.

X-Ray Treatment.—In view of the prominence given recently to the Erlangen treatment, it is interesting to note several communications that have appeared on the subject.

J. C. Webb[1] contributes an exhaustive article dealing with deep x-ray therapy in malignant disease, and based on notes of a visit to Erlangen. He discusses the principle underlying this method in its physical, biological, and therapeutic aspects. The inferences to be drawn from his impressions may be summarized thus: The Erlangen treatment is a fundamental and epoch-making improvement on pre-existing methods of x-ray therapy, and it is the technique to be adopted in all cases (other than purely superficial lesions) where this form of therapy is indicated. As in all other treatments, the earlier a suitable case is treated the better are the results. It is the treatment of choice in all cases of menorrhagia or metrorrhagia in patients over 38, provided suppurative disease of the tubes or ovaries be excluded. All the foreign authorities agree as to the immense value in every malignant case of either pre- or post-operative raying, or both, according to circumstances. Great use is made of deep x-ray therapy in tuberculous disease of the glands, bones, etc., as an auxiliary to other treatments. Personally, Webb is convinced that this new therapy has opened up a fresh avenue of treatment and has enormously increased the field for the curative use of x-rays.

R. Morton,[2] of West London Hospital, describes the principles of the treatment, the technique and application, and the results. With regard to the alleged dangers, he says it is generally admitted that, in all cases depending on human control for their proper application, accidents are liable to happen; lives have been lost through errors in dispensing dangerous drugs. Apart from this risk, the Erlangen method is not dangerous in competent hands. During the past year he has treated not less than 300 cases by this method without seeing any severe x-ray burn, nor has there been a single instance of sloughing. While the great majority of these cases have not been favourable from the point of 'apparent clinical cure' or more or less prolonged relief, he has seen enough to justify the statement that not only is the Erlangen method the best system of x-ray therapeutics yet devised, but that it is probably the most important recent contribution to the solution of the problem of malignant disease. The system has its limitations: it is of little use, for example, where the general health is seriously impaired, as in cancer of the stomach; it is of no help where the disease is extensive or after dissemination has begun, and in certain other cases. The conditions favourable for success are: the general health of the patient; the localization of the lesion to a reasonably small area; the complete and accurate carrying out of the technique at one sitting; and the careful control of the patient's health subsequent to irradiation. Given these conditions, it is practically certain that the growth will disappear, and with but a trifling disturbance of the patient's ordinary life.

H. K. Ward,[3] in a personal impression of the Erlangen Frauenklinik, describes the apparatus used and discusses the question of dosage. Dealing with treatment he says that the Erlangen school have had more experience with treatment of cancer of the cervix uteri than with any other variety. In this the results have been promising. He regards the method as a scientific application of the dosage of x-rays, but he adds a warning to the effect that, as the dose is so near the danger limit, more harm than good may result unless the worker has an intimate knowledge of the apparatus.

In an article dealing with the histological processes involved in x-ray treatment of cancer, A. Lacassagne[4] discusses the action of the rays on various forms of cancer. He points out that in the presence of differences so great as those occurring in the histological mechanism, each variety of cancer ought to have its appropriate radiographic technique, and he hopes that some day our knowledge of the subject will become sufficiently exact to permit of this.

REFERENCES.—1. *B.M.J.*, Jan. 21, 1922, p. 92. 2. *Lancet*, Feb. 25, 1922, p. 364. 3. *Ibid.*, p. 366. 4. *Paris méd.*, Feb. 18, 1922, p. 143 (Special Cancer Number).

Radium Treatment.—In the Report of the Radium Institute recently issued[1] reference is made to the treatment by radium of various forms of cancer. The variety which received the greatest number of treatments was uterine cancer, of which 84 cases are reported. Of these one was 'apparently cured,' 38 improved, and 16 not improved. Of cancer of the buccal, oral, lingual, and pharyngeal mucous membrane 69 cases are recorded; of these 4 were 'apparently cured,' 9 improved, and 23 not improved. Other varieties treated were glabrous skin cancer and cancer of the oesophagus, larynx, vulva, vagina, bladder, and cornea; of these only a comparatively small number showed improvement or 'apparent cure.' A large number of cases of cancer of the breast and of the rectum were treated also; of these about half the number were 'improved.' The term 'cured' is not used in the Report in reference to cases of malignant disease, it being considered unjustifiable so to describe any case treated for the first time during the past year. The term 'apparent cure,' however, is to be interpreted as representing a condition in which all trace of the original lesion has disappeared, in which there is no sign of any recurrence, and in which the patient is free from any indication or symptom of the disease. Cases classified as 'improved' are those in which the treatment has shown a definite and marked degree in benefit.

At the Congress of Gynaecologists and Obstetricians held in Paris in September 1921 a number of communications were presented dealing with the radium treatment of uterine cancer. The method used by F. Daels,[2] of Ghent, entitled *drainage radiumtherapeutique*, was favourably commented on by several. This consists in introducing several drain tubes from various points, each containing one or more radium applicators. Daels reported on 18 cases successfully treated by his method. Cases were reported at this Congress showing that radium treatment can be applied without interrupting a pregnancy.

The use of the gamma rays from radium is the subject of a chapter in a recent Report by the Medical Research Council (see Editorial on p. 140).

REFERENCES.—1. *Radium Inst. Report*, London, Jan.-Dec. 1921. 2. *Gynéc. et Obstét.*, Nov. 1921, p. 459.

General.—A. Schneider,[1] an American observer, discussing the cause of cancer, concludes that it is caused by plasmodia belonging to the group of sporozoa, the sexual cycle of which takes place in a species of amoeba, the asexual cycle being completed in human tissue cells, and giving rise to specific tumour formation. Emetine being the most efficient amoebicide, he uses it as a remedy, giving 5 grains (0·3 gm.) intravenously or hypodermically diluted with 150 c.c. of normal saline, and combined with a tonic and stimulating dose of strychnine. Emetine kills the amoebal host of the cancer plasmodium and apparently also the asexual cycle in the human tissue cells. As a result further progress of the cancerous growth is completely checked. The dead cancer tissue may be removed surgically, or its elimination and resorption may be effected by other means. The author admits that such large doses of emetine are not without danger, and says that he is now trying other efficient but less toxic amoebicides.

J. Katz[2] gives an account of the methods of early diagnosis of gastric cancer. Important points to be noted are: Age (40 or over), sudden onset, history of gastric ulcer, anorexia, loss of weight and of strength, anaemia, cachexia, palpable tumour, pain in gastric region, vomiting, examination of gastric contents, of faeces, and of blood, x-ray examination, laparotomy. In connexion with examination of gastric contents he refers to the Wolff-Junghans reaction, which he recommends as a useful test, a positive reaction being significant. This reaction consists in a quantitative estimation of the soluble albumin in the gastric extracts after a test meal, increase of dissolved proteins to higher dilution indicating carcinoma. (See next paragraph.)

REFERENCES.—1. *Amer. J. Clin. Med.*, Feb. 1922, p. 118. 2. *New York Med. J.*, Feb. 1, 1922, p. 153.

DIAGNOSTIC AIDS TO TREATMENT.

Cancer of the Stomach.

BY means of the Wolff-Junghans test, which determines an increase of soluble proteins in the gastric contents, it is possible frequently to detect cancer of the stomach. The reagent is prepared as follows:—

Phosphotungstic acid - - -	0	30
Hydrochloric acid, strong - - -	1	00
Alcohol, 96 per cent. - - -	20	00
Distilled water - - -	to 200	00

The patient is given a light meal the evening preceding the examination. Next morning an Ewald test breakfast is given; this is extracted 45 minutes after ingestion, and the contents filtered until clear. Six test tubes are taken, and by means of a graduated pipette a portion of the filtered contents is placed in each tube—one c.c., 0·5 c.c., 0·25 c.c., 0·1 c.c., 0·05 c.c., 0·025 c.c.—the volume of each being made up with distilled water to 10 c.c. and mixed well. To each tube is added carefully one c.c. of the reagent: a white ring will appear at point of contact. Normally this will appear in the first five dilutions, and occasionally in the sixth. In carcinoma the white ring will appear in still higher dilutions, 0·01, 0·005, and sometimes even higher.

NEW REMEDIAL AGENTS.

The Alkaloids of Cinchona and their Derivatives.

DURING the past few years the alkaloids of cinchona bark and their derivatives have been the subject of considerable study, in consequence of which our knowledge regarding them has undergone considerable modification. Numerous researches have been reported, and foremost among these are perhaps those of H. W. Acton, whose lengthy contribution to the *Indian Journal of Medical Research* was referred to in our February issue, p. 70. Since that appeared the same author has published another exhaustive article (*Lancet*, Jan. 21, 1922, p. 124), in which he deals with the relations to one another of the various cinchona alkaloids, and with the pharmacological action as determined by such relationship. Quinine, for example, has generally been regarded as a methoxy derivative of cinchonine, but since quinine is laevorotatory and cinchonine is dextrorotatory this relationship is improbable. The true relationship is: the laevorotatory alkaloids cinchonidine, cupreine, and quinine form what Acton calls the 'cinchonidine series'; while cinchonine, cupreidine, and quinidine—all dextrorotatory alkaloids—comprise the 'cinchonine series.' This is very confusing, owing to the unscientific nomenclature originally adopted, which cannot now be altered, as to do so would simply make the confusion worse. (Had cinchonidine and cinchonine been transposed, and each called by the other name, it would have brought all the alkaloids containing 'd' into the dextrorotatory series; at present the names give a wrong indication of the chemical relationship.)

In 1919 Acton and others found that while quinine was specific for certain malignant tertian infections, the case was different in infections of a benign character, a complete cure not being afforded although the immediate effects were excellent. The same observers found that the total alkaloid of the bark known as 'cinchona febrifuge' was more efficacious in curing these benign tertian cases, and that this curative effect was largely dependent on the quinidine content. In fact the dextrorotatory alkaloid was more efficacious than its laevorotatory isomer, a difference that has been noticed elsewhere in pharmacology.

As many as fourteen alkaloids have been isolated from various species of cinchona: these include cupreine (from cuprea bark) and cupreidine (not yet isolated as such), both of which are hydroxycinchonines and from which the various cupreine derivatives, to be discussed later, are prepared synthetically. Acton classifies the crystallizable cinchona alkaloids into two groups: the natural alkaloids and the hydro-alkaloids. The natural alkaloids are:

1. *Cinchonine* and its laevorotatory isomeride *cinchonidine.*
2. Hydroxycinchonine or *cupreidine* and its laevorotatory isomeride *cupreine.*

3. Methoxycinchonine or *quinidine* and its laevorotatory isomeride *quinine.*

The hydro-alkaloids may be prepared by hydrogenation of the natural alkaloids; they occur in very small quantities in the bark. They are:

1. *Hydrocinchonine* and its laevorotatory isomeride *hydrocinchonidine.*
2. Hydro-hydroxycinchonine or *hydrocupreidine* and its laevorotatory isomeride *hydrocupreine.*
3. Hydro-methoxycinchonine or *hydroquinidine* and its laevorotatory isomeride hydroquinine.

Acton's researches on the pharmacological action of these alkaloids may be summarized thus: The cinchonine or dextrorotatory series have a greater inhibiting action on the digestive enzymes than have those of the laevorotatory or cinchonidine series. This inhibition is greatest with trypsin, less with pepsin, and feeble with erepsin. Given half an hour after a meal they would not interfere with ptyalin digestion. The inhibition being greater in stronger concentrations, large doses should be avoided and the alkaloid given well diluted. Inhibition is less when the ferment is first allowed to attack the protein; it is desirable, therefore, to give the alkaloid after a meal. The mono-salts (*e.g.*, commercial sulphates) should always be given with acids to prevent their using up the free HCl in the stomach. In pills the bihydrochloride and bisulphate should be prescribed. When diarrhoea is observed after their use this is probably due to interference with digestion and not to any action on the intestinal muscle. Acton's general conclusions are that (1) the dextrorotatory alkaloids, cinchonine series, are more powerful than their laevorotatory isomerides, the cinchonidine series; (2) the hydro-alkaloids are more stable and more active in many respects than the natural alkaloids; (3) the higher members of both series are more toxic to mammals, protozoa, and bacteria than the lower members. The parasiticidal action of these alkaloids on the malarial parasite can be arrived at only by direct observation on malarial patients.

The use of quinidine sulphate in the treatment of auricular fibrillation was fully dealt with in THE PRESCRIBER, February, p. 65.

Cupreine Derivatives.—Reference has been made above to the synthetic derivatives of cupreine. Although grouped with the alkaloids of cinchona, cupreine is obtained not from the official cinchona but from cuprea bark, *Remijia pedunculata* and other species, in which it occurs along with other cinchona alkaloids. As already pointed out, cupreine is allied to cinchonine, being the laevorotatory isomer of hydroxycinchonine. In recent years several derivatives of cupreine have been prepared synthetically and found to possess certain therapeutic properties of their own. For a time these compounds were made only in Germany and the war put a stop to their use. They are now easily obtainable, being made by Messrs Howards & Sons, the well-known makers of quinine, and the following is a list of those available. The names given in italics indicate their chemical composition; the trade-names are given within quotation marks.

Methyl-hydrocupreine or *Hydroquinine* is obtained by the hydrogenation of quinine. It is specific for malignant tertian malaria, and as it is more active than quinine smaller doses are necessary. The dose is 0·2 gm. (3 grains). As much as 0·6 to 0·8 gm. (9 to 12 grains) may be given daily with safety, and it has been found that 0·75 gm. has the same effect as one gramme of quinine.

Ethylhydrocupreine or 'Optochin' is obtained by the ethylation of hydrocupreine. It is a powerful pneumococcicide and is regarded as specific in ulcus corneae serpens (pneumococcal corneal ulcer). It has also been used in pneumonia, etc. H. E. Dixon ('Manual of Pharmacology,' 5th edit., p. 228) says: 'There can be no longer any question that this alkaloid kills the pneumococcus in the blood of man when administered in doses that it is perfectly permissible to administer. . . . Unfortunately treatment by ethylhydrocupreine is not free from danger. It is well known that quinine in medicinal doses may contract the field of vision and even produce blindness. This effect seems to be more pronounced with ethylhydrocupreine.'

Isopropylhydrocupreine or 'Cinchaine' possesses powerful anaesthetic properties and has been successfully used as a local anaesthetic in urological practice. A solution of 0·1 per cent. strength is said to have the same anaesthetic effect as a 3 per cent. solution of quinine.

Iso-amylhydrocupreine or 'Eucupin' is a powerful antiseptic and anaesthetic. It has been recommended for influenza, scarlet fever, etc., as an anaesthetic for the bladder, and as an antiseptic wash for diphtheria and other affections of the nose and throat.

Iso-octylhydrocupreine or 'Vuzin' has a specific action on streptococci and staphylococci, and is used in the disinfection of wounds, a solution of strength up to 1 : 1000 being injected. According to Bainbridge, the name 'vuzin' is taken from Vouziers, a small town in northern France, where this product was first used by the German surgeons.

As these cupreine derivatives have only recently been put on the British market there is at present very little literature regarding them. So far the majority of the references have appeared in the country of their origin.

Syrup of Iodide of Manganese.

The value of manganese as a therapeutic agent in cases in which iron is indicated has led Guyot (*L'Union pharm.*, Feb. 1922, p. 40) to devise a syrup of manganous iodide on lines similar to the well-known syrupus ferri iodidi. The syrup of iodide of manganese may be given mixed with the syrup of iodide of iron, equal parts, the therapeutic properties of the latter being augmented thereby. The formula and method of preparation are as follows :—

Take of :	Manganese, in fine powder	2·50 to 3·00 gm.
	Iodine	4·10 gm.
	Orange flower water	10·00 c.c.
	Tartaric acid	1·00 gm.
	Syrup	990·00 gm.

Place 2 gm. of the manganese in a flask with the orange flower water, and add the iodine in small portions. Reaction will take place with evolution of heat, the liquid changing from green to red with disengagement of iodine vapour. When the contents of the flask have cooled, add in small portions the remainder of the manganese so as to ensure an excess of the metal. As soon as the liquid has acquired a rose tint, filter rapidly into the syrup, in which the tartaric acid (preservative) has already been dissolved. The resulting product is water-white, the rose tint being kept back by the filter, and will keep so for at least six months ; the formation of a yellow tint indicates decomposition. Should it be desired to make a concentrated 'liquor mangani iodidi' for dilution as required, the liquid may be filtered into 50 c.c. glycerin instead of into syrup.

New Drugs and Preparations.

[In the case of items marked * the information is derived mainly from makers' advertisements.]

Amylzyme is an extract containing all the digestive enzymes of the fresh pancreas of the hog. It digests starch and protein and splits fats, and is recommended in digestive disturbances resulting from a deficiency of pancreatic secretion. Dose, 0·13 to 0·26 gm. (2 to 4 grains). Supplied in capsules of 2 grains (G. W. Carnrick Co.).—*J.A.M.A.*

Aspochin is described as the acetyl-salicylate of acetyl-salicylic quinine ester, containing 51·6 per cent. of acetyl-salicylic acid and 48·4 per cent. of quinine. Used in neuralgia, etc.

Atochinol is the allyl ester of phenylcinchoninic acid (atophan) and is used for the same purpose as atophan.

***Bismhydral** is a compound of bismuth and mercury recommended for use in the treatment of syphilis.

Chaulmestrol is a mixture of the ethyl esters of the unsaturated fatty acids of chaulmoogra oil for use in leprosy. It is made in America and appears to be very similar to *Moogrol* (see Prescr., Oct. 1921, p. 363).—*J.A.M.A*

Cinnozyl is a combination of cholesterin and benzyl cinnamate, for immunization against tuberculosis.

Colloid Calcium is a colloidal solution of calcium recommended by E. E. Prest (*Lancet*, Jan. 14, 1922, p. 53) for treatment of tuberculosis. Dose, 0·5 to 1·0 c.c. Strength 1 : 2000.

Cresineol is said to be a chemical compound of ortho-cresol and cineol, the active principle of eucalyptus oil. It is supplied in tablets for use as an internal antiseptic, and in blocks for disinfecting purposes.—*Med. Press.*

Cuprocian is a double cyanide of copper and potassium, recommended for tuberculosis (see Prescr., Feb., p. 92). Under the name of *Cyanocuprol* it was described in these pages in 1916.

Flavizid is a flavine compound of German manufacture. In composition it appears to be very similar to homoflavine (see Prescr., Jan. 1922, p. 20). Under the trade-name of *Diphthosan*, pastilles of this substance have been recommended for treatment of diphtheria carriers.—*Merck's Report.*

Hormonax (formerly called *Hormonin*) is a preparation of normal serum recommended by Dr Montgomerie Paton in his book on 'Hormone Therapy.' It combines the action of serum and drugs. Dose, ʒii 3 or 4 times daily (F. G. Faulding & Co., London).

Iodaseptine (see Prescr., Feb., p. 93) is described as 'iodo-benzo-methyl-formine,' recommended in tuberculosis.—*Paris méd.*

Iodosalyl is made by heating together iodine 2, salol 25, olive oil 100. It is recommended by Daniel as a remedy for trypanosomiasis, being given by intramuscular injection.—*Presse méd.*

Mercurosal is the disodium salt of mercury salicyl-acetic acid, referred to (Prescr., Feb., p. 88) as a remedy for syphilis. Dose, 0·05 to 0·1 gm. (Parke, Davis & Co., London).

***Metagen** is a preparation said to contain the three vitamins in concentrated form. Issued as capsules (Parke, Davis & Co.).

Phenyl-ethyl-hydantoine, or phenyl-ethyl-glycolyl-urea, is a synthetic hypnotic analogous to luminal, or phenyl-ethyl-malonyl-urea. It is soluble in water and may be given hypodermically, and is said to be superior to, and less toxic than, both veronal and luminal. Dose, 0·3 to 0·75 gm. in 24 hours.—Gelma and Schwarz : *Paris médical.*

Quinidine Sulphate, used in the treatment of auricular fibrillation (see Prescr., Feb., p. 65), is the sulphate of an alkaloid of cinchona, a dextro-rotatory stereo-isomer of quinine. Dose, 3 to 6 grains (0·2 to 0·4 gm.).

Résyl is the glycerin ester of guaiacol, a French preparation used in treatment of typhoid fever. See Prescr., Feb., p. 93.

Sodium Bismuth Tartrate, recently recommended for syphilis (see Prescr., Feb., p. 88), is sodium or potassium tartro-bismuthate. It is given intramuscularly in oily suspension.

Tryparsamide is the sodium salt of N-phenylglycine-amide-*p*-arsonic acid, recently put forward as a remedy for trypanosomiasis.—*J. Exper. Med.*

Laboratory Reports on New Preparations.

COFORMALIX.

(George Lunan, F.C.S., 20 Queensferry Street, Edinburgh.)

Coformalix is a compound elixir of the formates of calcium, sodium, and strychnine ($\frac{1}{60}$ grain in each drachm), with free formic acid. The value of the formates has been the subject of much discussion among pharmacologists, and those whose experience is confined to experiments upon healthy animals say they are of no value ; clinicians, however, who have to do with the human body in disease, think otherwise, having found their tonic action to be undoubted. Coformalix presents the medicinal formates in a very beautiful and palatable form, and the preparation ought to prove effective in the capacity claimed for it—that of a tonic for administration in convalescence after influenza and similar complaints. Coformalix is prepared with Glycerophosphates, with Hypophosphites, with Diastase, and with Pepsin.

PRESCRIBING NOTES.

PEDICULOSIS.

The use of bile salt (sodium taurocholate) as a remedy for pediculosis is advocated by B. A. Peters (*B.M.J.*, Feb. 18, 1922, p. 264). The following solution, applied to the hair, kills pediculi quickly :—

Sodium taurocholate - - - -	10	0
Oil of eucalyptus - - - -	50	0
Water - - -	to 100	0

The bile salt is dissolved in the water, the oil added, and the whole shaken well. The lotion should be rubbed in well till all the hair is thoroughly wetted ; the head is then wrapped in a towel, or a bathing cap put on, and the hair left wet overnight. In addition to destroying the insects, this application also kills the embryos. It is safe, non-toxic, non-inflammable, and inexpensive. One application is often sufficient, though some cases may require more.

The use of acetic ether (ethyl acetate) is recommended by W. Schnell (*Deut. med. Woch.*, Oct. 20, 1921, p. 1254) as a safe and quick method of getting rid of head lice. He uses a special type of hood, which, while fitting the head tightly at the outer border, so as to prevent the escape of vapours, has a roomy crown with sufficient space for the hair to hang loose, thus permitting the fumes of ethyl acetate to penetrate to all parts of the head. From 5 to 10 c.c. of ethyl acetate is distributed as evenly as possible over the hairy scalp, whereupon the hood is immediately applied and drawn tight across the forehead and tied behind the head. The lice are usually all killed at the end of fifteen minutes, but it is safer to leave the hood on for half an hour. As a rule, the nits are also killed by one application, but it is as well to give a second application after an interval of a week, when any nits that may have escaped will have hatched out. The ears should be protected by rubber stoppers, especially in the presence of a perforated tympanic membrane.

NOTES AND QUERIES.

Note.—The Information Department of this journal is at all times freely at the disposal of subscribers. Inquiries should be addressed to the Information Department, The Prescriber, 6 South Charlotte Street, Edinburgh, and should contain a stamped envelope for reply. Answers are sent direct as early as possible, and the more important replies are summarized from time to time in this page. We cannot undertake to reply to non-subscribers.

Magnesium Sulphate in Sciatica (*J.J.*, 17/1/22).—In The Prescriber of November 1915, p. 246, reference was made to the use of magnesium sulphate injections in acute articular rheumatism by Thiroloix of Paris. He used a 25 per cent. solution in sterile water, the dose being 4 c.c. It is recommended that the injections be given in conjunction with sodium salicylate, when they arrest the disease in four or five days. We believe that similar injections have recently been given with success in sciatica. The use of epidural injections of normal saline is referred to in our February number, p. 78.

Cedarwood Oil in Gonorrhoea (*A.F.*, 4/2/22).—The note in our February number, p. 62, was taken from a report of Lautier's communication to the Société de Therapeutique. It would appear that cedrol, the solid camphor of cedarwood oil, is closely related chemically to santalol, the principle of sandalwood oil, and the use of cedarwood oil in the treatment of gonorrhoea is to that extent justified. Cedrol, however, is not present in all samples of cedarwood oil.

Hyoscine in Morphinism (*J.E.*, 6/2/22). — References to the use of hyoscine in the treatment of morphinism will be found in The Prescriber, Oct. 1912, p. 255 ; May 1914, p. 160. Doses and administration of hyoscine as a hypnotic will be found Feb. 1918, p. 38, and Feb. 1922, p. 66.

REVIEWS OF BOOKS.

Shaw.—*Hyperpiesia and Hyperpiesis.* By H. Batty Shaw, M.D., F.R.C.P. Pp. 191. (Frowde and Hodder & Stoughton. 21s.)

This work on hypertension represents the study over a period of years in University College Hospital of a large number of cases of raised blood pressure, in whom during life records of blood pressure were taken at frequent intervals, and for the most part daily. Of these cases fifty were followed to post-mortem examination and the cause of the condition sought for in the gross pathological conditions then revealed. The first section deals with the clinical and post-mortem reports on those cases ; this is followed by a section devoted to a critical analysis of the sex, occupation, age at death, symptomatology, history, mode of death, and histology of organs.

The result of this very exhaustive examination has led the author to the conclusion that the classical conception of hypertension as an expression of pathological changes, acting for the most part mechanically and pointing to gross changes in the kidneys, the heart, and the arterial system, must be to a large extent abandoned. The research has shown that many cases of hyperpiesia were found to present no abnormality of kidney structure and no marked evidence of atheromatous vascular occlusion. The point is well taken that the pressure charts show variations in pressure readings, which suggest that the actual cause of hyperpiesis may prove to be an agent or agents of toxic nature which, acting at the neuro-muscular junction, may operate chemically, physically, or chemico-physically, and that these agents may be bodies in circulation in the blood stream. Experimentally it has been proved that the toxins of bacterial origin do operate at such sites, and that they are for the most part depressor in action. This leads to the question whether there are similar bodies which may act as pressor agents at these sites, and the action of certain pressor toxins now known to be produced by the action of certain organisms of the *B. coli* and Friedländer group (*e.g.*, *B. aminophilus*) upon tryptophane, tyrosin, and others of the amino acids in the terminal coil of the ileum, is reviewed as a possible source of the excitant of hyperpiesis. These toxic substances are, however, rendered inert in the liver and appear in harmless non-toxic forms in the urine as indican, indirubin, indol, tyramine, etc., and their passage in quantity through this outer guard can only occur, in the reviewer's opinion, when the catarrhal area in the bowel is so extensive or so sharply involved as to permit of the absorption of these pressor toxins in unusual amount by the lymphatics. Such a condition would be very intermittent and the liver would then itself show acute signs of overwork in dealing with the portal toxaemia.

The question of a tissue extract or autolytic product supplying the necessary pressor toxin has been experimentally investigated by the author, and he has been able to confirm the discovery by Tigerstedt and Bergman of a pressor toxin, renin, in kidney substance which, injected into other animals, is capable of raising the blood pressure. It is suggested that certain cases of hyperpiesia may be due to this agent, and that further investigation will discover other similar tissue substances of pressor nature.

The conclusion that bacterial infections may provide the most common pressor toxins is certainly supported by clinical evidence. In the reviewer's own experience the typho-coli group infection leads rather to hypopiesis, the streptococcal to hypertension. It is to the sthenic group rather than to the asthenic that we must turn for our pressor toxins.

Dr Batty Shaw and his assistants in this research are to be congratulated on the results of this very laborious task, and the present work will deservedly take a high place in the literature of blood pressure studies.

WILSON.—*The Clinical Study of the Early Symptoms and Treatment of Circulatory Disease in General Practice.* By R. M. Wilson, M.B. Pp. 245. (Frowde and Hodder & Stoughton. 15s.)

Books such as this are apt to upset the experimentalist. The pure laboratory physiologist and pharmacologist have long held sway, but it now looks as if the practical clinician was about to have his innings. More is to be learnt by observation clinically than by mere experiment in a laboratory with a test-tube or an animal. Dr Wilson gives us in this volume the results of personal observations. As a basis he starts off with the consideration of what constitutes exhaustion, and then goes on to look at exhaustion in relation to cardiac involvement. Next he investigates its mechanism and determining causes as well as its diagnostic significance. Then he takes up seriatim the various possible manifestations of heart disease, such as alteration of pulse-rate, extra systoles, dyspnoea, cyanosis, cardiac pain, and so on. Lastly he devotes a chapter to the earliest symptoms of heart failure, and ends up by indicating lines of treatment founded on those early signs and symptoms. This book certainly strikes the right note. It is high time that we broke away from the traditional teaching of the pure physiologist, and came back to the bedside of our patients, for it is there we must eventually get to know the real meaning of signs and symptoms in disease. We cannot have too many books of this nature, for they are at once helpful and stimulating.

STEPHENS.—*The Prevention and Relief of Heart Disease.* By G. Arbour Stephens, M.D. Pp. 91. (Arthur H. Stockwell. 5s.)

This delightfully written volume has been penned with the view of attracting attention to the economic aspect of this great question. 'Man's welfare consists of his activities and his enjoyment of these activities.' On this axiom Dr Stephens bases all he has to say about this important subject. One of the weak spots in our national system of treating patients is the lack of suitable means of convalescence, and dosing with drugs (and such drugs as are on the list for panel patients !) should constitute but a small part of treatment. The idealistic treatment is beyond the means of the average worker. The school period offers unique opportunities for the prevention of cardiac disease and for limiting its progress once it has occurred. No efforts for the relief of cardiac cripples can be attended by any genuine success which do not arrange for them to have some form of employment whereby they can contribute to the national wealth. Dr Stephens strongly advocates the establishment of 'cardiac classes' in connexion with our general hospitals. The book is the outcome of much thoughtful and original observation, and deals very practically with a vast and most important question of national importance.

WALKER.—*An Introduction to Dermatology*. By Norman Walker, LL.D., M.D., F.R.C.P. Seventh Edition. Pp. 366. (Green & Son, Edinburgh. 21s.)

The fact that this is the seventh edition of a work by an acknowledged authority in itself disarms criticism. Walker's Dermatology is not only a popular book with Edinburgh graduates, but is regarded over a much wider field as a standard work of practical value. In his preface to this edition the author states that while he has not dealt so fully with the newer methods as some might wish, it is not because he is hostile to them, but because he thinks that new ideas should be carefully digested before they are allowed to appear in a book designed in great part for students. Nevertheless there is an excellent colour plate showing the skin reactions to proteins (p. 61) which is most interesting and instructive in view of the recent work on that subject.

The work bears evidence of very careful revision, and as in previous editions the coloured illustrations are a feature. There are no fewer than 84 plates, nearly all of which are in colour. The entire get-up of the book reflects the greatest credit on the publishers and on the printers (The Darien Press), and Dr Walker's book takes a high place as a standard work, appropriately produced.

LAPTHORN SMITH.—*How to be Useful and Happy from Sixty to Ninety*. By A. Lapthorn Smith, M.D., M.R.C.S. Pp. 237. (John Lane. 5s.)

Dr Lapthorn Smith is a firm believer in the possibility of reaching a healthy, happy, and useful old age, and has written this book in order to convince the public. He certainly 'gets there,' for a perusal of his book is most convincing. He has, unfortunately, a cumbersome and far from elegant style—the title of the book is in itself an example of this—with an irritating tendency to digression; there are one or two inaccuracies, such as the reference to Sir William Wren (p. 23); and he is too fond of quoting newspaper paragraphs, in whose veracity he seems to have an almost child-like faith. It says much for Dr Smith's matter that, notwithstanding all these defects, the book is not only absorbingly interesting but exceedingly forceful, and the bright and cheery outlook he takes is most infectious. He is a little intolerant of tobacco, being evidently a non-smoker himself, but he permits it in moderation. His teaching on the whole is sound: keep working, take exercise, eat little, avoid constipation, drink water freely, mix with young people, dress well, avoid worry, and so on—all good advice for elderly people. And this advice is given in a cheery way that makes one feel better for reading the book. We wish the book all success. Dr Smith has rendered a service to the community in writing it, and the few blemishes we have pointed out can readily be remedied when future editions are called for, as they are certain to be.

KIRKPATRICK.—*Cataract and its Treatment.* By Henry Kirkpatrick, M.B., Lieut.-Col. I.M.S. (Retd.). Pp. 201. (Frowde and Hodder & Stoughton. 12s. 6d.)

Ophthalmic surgeons will be grateful to Col. Kirkpatrick for presenting in this volume, in condensed form, all that it is important they should know about cataract. Its compendious nature will make it equally welcome to the general practitioner. The greater part of the book is devoted to the operative treatment of cataract, and in almost every line the author gives his readers the benefit of his extensive experience. Each chapter takes up a different aspect, from the anatomy of the lens to the treatment of after-cataract and the results of operation.

In discussing medicinal treatment the author recommends radium and potassium iodide, and refers to Dor's treatment with calcium chloride and sodium iodide already described in these pages. There are many other practical suggestions in the book, the entire contents of which, as well as the printing and style, are in every way in keeping with the standard of the Oxford Medical Publications.

LITERARY NOTES.

Dr Firth's HEALTH IN FEW WORDS deserves more than a passing reference, because the statements it contains are remarkably good. This folding booklet gives much valuable advice on such matters as the dwelling, infection and disinfection, water, food, and infant-feeding. Dr Firth states that 'tinned milk cannot replace entirely cow's milk.' This statement cannot be too strongly emphasized at the present time. We are most favourably impressed with all that Dr Firth has to say. The booklet is published at twopence by Messrs John Bale, Sons & Danielsson, Ltd.

The TRANSACTIONS OF THE LONDON DERMATOLOGICAL SOCIETY will be found most interesting to peruse. The volume is published by Messrs John Bale, Sons & Danielsson, Ltd., at 2s. 6d. Some of the papers are of special value, notably that by Dr Prosser White on 'Some Auto-Infections,' the one by Dr R. Craik on 'The Ringworms,' and Dr I. M. Legge's most helpful contribution on 'Industrial Dermatoses.' We congratulate this progressive Society on the completion of another most successful year under the able presidency of Dr Prosser White.

The third issue of Dr H. R. Harrower's MONOGRAPHS ON THE INTERNAL SECRETIONS deals with Epilepsy as an Endocrine Disorder. It discusses the possible relations of this disease to the ductless glands, reviews the literature, and gives a good bibliography. These monographs are issued by the Harrower Laboratory, Glendale, California, and the price of this one is $1.25.

Two numbers of THE JOURNAL OF NEUROLOGY AND PSYCHOPATHOLOGY—November 1921 and February 1922—are to hand. The November number has an article on The Relation of Psychoneuroses to Mental Deficiency, by E. Prideaux, together with other articles, notes, abstracts, and reviews. That of February has an article on Mental Deficiency by A. F. Tredgold, another on Colloidal Reactions on the Cerebrospinal Fluid by Messrs Riddel and Stewart, along with other features and the Index to Vol. II. The journal is published quarterly by Messrs Wright & Sons, Bristol, and the subscription is 30s. per annum, single copies 8s. 6d. post free. The paper and printing are good, and the matter is of the highest class.

Our contemporary, Paris Médical, has issued its programme of special numbers for 1922. These are to be 22 in number, that is two each month, except August and September, which are to have one each. The subjects dealt with are similar to those of previous years, but more subjects appear to be included. We have already referred in terms of high commendation to these issues, and we can say from those that have already appeared that our contemporary is well maintaining its previous high standard.

Now that hostilities are over and communication is opened up with Germany, Merck's Report is again coming to hand. We have recently received the volume for 1919-20, dated November 1921—the first after seven years' interval. It is in German, and is arranged in the usual style, containing notes on the therapeutic uses of such drugs as have come to the front during the period under review. There is little in it in the matter of new remedies that has not appeared in The Prescriber, but there are numerous references to German and Austrian literature which give the Report a value of its own.

The Crookes Laboratories (British Colloids, Ltd.) have issued an interesting brochure entitled Collosol Argentum, which deals with the therapeutic applications of colloidal silver. The literature on the subject is collated and abstracted, and the superiority of colloidal silver to the old-fashioned solutions of silver nitrate is clearly demonstrated. The book is issued gratis to the medical profession.

A very well written brochure on Organotherapy has been issued by Messrs Oppenheimer, Son & Co., Ltd. While primarily designed to show the application of the products of this firm, it contains much useful information regarding the endocrine glands, and will be found very helpful to the general practitioner.

THE EASY CHAIR.

Recent Books of Outstanding Merit.

What a rich crop there has been during the past ten years of books describing and analysing the characters of the actually or supposedly great among contemporary men and women. The crop is rich in two senses: it is prolific and it is (so far at least as regards the harvest to date) admirable. The fashion of writing this particular type of book was set by none other than Mr A. G. Gardiner, till recently editor of the *Daily News*. His three volumes of essays in this vein are entitled Pillars of Society; Prophets, Priests, and Kings; and The War Lords. Then came Mr E. T. Raymond with his Uncensored Celebrities and All and Sundry; far more searching and more judicial than A. G. G. Afterwards came The Mirrors of Downing Street, and now, last of all, comes The Pillars of the State, by Herbert Sidebotham (Nisbet: 10s. 6d.), occupying a position midway between that of Gardiner and that of Raymond; less biased than the former, less brilliant and arresting than the latter. In some ways, however, it is better than either. It is tersely written, it makes a successful attempt to deal with essentials, it throws no mud, it scorns the cheap laugh, and it deals with public men as such and avoids too close a prying into their private weaknesses. It is a fascinating volume withal.

Of special interest to medical men is the latest volume from the pen of that versatile cleric, Bishop Mercer—or, to give him his full title, the Right Rev. J. E. Mercer, D.D., sometime Bishop of Tasmania. The said work has nothing to do with theology and not a great deal with philosophy. It is called ALCHEMY: ITS SCIENCE AND ROMANCE (S.P.C.K.: 10s.). It falls to few writers to achieve the distinction of being at once accurate and popular; instance Fabre, Hudson, Lodge, Thorpe, and half a score more and the list is well-nigh complete. Among this half-score must be included Bishop Mercer—philosopher, theologian, man of science, and famous preacher. It would be difficult to say whether he will live longer for his contributions to philosophy or for his lucid, analytic surveys of the trend of modern science. Perhaps the first essay in the latter vein is the volume before us; and it is as fascinating as it is important. Science progresses so rapidly, its movements seem so revolutionary, its discoveries are so recent, so vast and so portentous, that we are apt to think of the present as the only scientific period that matters. We are apt to forget that although, in the words of Confucius, the past is for ever immovable, the present is but the condensation and essence of the past; and therefore that history is as important to science as it is to politics. Such a book, then, as this, which sketches the antecedents of the scientific outlook of to-day, is salutary, and may serve to warn us against the vice of taking our present-day science too seriously. Bishop Mercer deals faithfully with the history of alchemy, and the book's greatest merit is, that it shows the development of alchemy into 'modern' chemistry. This latter is a contribution of no mean order, alike to philosophy and science.

I do not know whether it is correct to say that Mr John Drinkwater has invented a new type of drama; but if not, his handling of an old type is so individual as almost to constitute something entirely novel. I have before me his three biographical plays—ABRAHAM LINCOLN, MARY STUART, and OLIVER CROMWELL. The last named was published only recently (Sidgwick & Jackson: 3s. 6d.). Like its predecessors, 'Oliver Cromwell' tells the story of its hero's life in a series of dramatic scenes. These carry one onward from the time of Oliver's innocent agricultural pursuits to the period of his Protectorate. Most dramatic of all is the sixth scene in which Cromwell and Charles confront each other—the latter as a prisoner; and the bluntness of the one is in sharp contrast with the *finesse* of the other. Cromwell is idealized by Mr Drinkwater, it is true; but the process, if showing some little historic bias, is pleasant in comparison with the shabby depreciation of certain recent writers. A noble poet, John Drinkwater handles a noble theme nobly. . R. CECIL OWEN.

BY THE WAY.

AIDS TO MEMORY.—A man on his way to a public dinner met a friend. 'Hullo, old man,' said his friend, 'I suppose you are off to the dinner, aren't you? Well, there is an old school-fellow of mine, by name Cummack, who will be there. I wish you would look him up and ask him to let me have his address, which I've lost, or, better still, come and see me. I meant to have come to this dinner myself, but some friends have turned up unexpectedly and I can't leave them.' 'Right,' said the other; 'what name did you say?' Cummack,' said his friend. 'You can easily remember that. You are going to dinner. That will suggest your stomach. Stomach—Cummack.' So they parted with a laugh. The next day they met again, when the man who had been to the dinner said: 'I'm awfully sorry, old chap, but I made most careful enquiries, and no one knew anything of your old school friend, Mr Kelly.'

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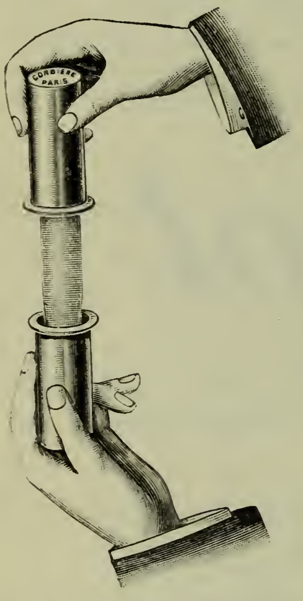

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Vol. XVI. EDINBURGH, MAY 1922. No. 188.

TREATMENT BY SUGGESTION.

REFERENCE to Dr Comrie's article in the present issue (p. 171) shows that treatment by suggestion is one of the oldest of therapeutic methods. What with Coué in the South and faith-healing in the North, this subject is very much before the public eye at the moment, and a study of the subject in the light of history is peculiarly instructive. We see, for example, how important a part temperament plays in the production of results from this method. There is a type of mentality to which suggestion distinctly appeals, while there are many persons on whom it has little or no effect. The great danger of such a method lies in this receptivity, and in the necessity for its cultivation. The cultivation of a receptivity for outside suggestion cannot but weaken the general moral character; whereas, on the other hand, the cultivation of will power has an opposite effect, for the suggestion comes from within. This distinction ought to be carefully kept in view: we cannot help feeling that the form of wholesale outside suggestion that is being boomed at present is distinctly detrimental to the moral stamina of those on whom it is being practised.

THE METRIC SYSTEM IN PRESCRIBING.

THE application in practice of the metric system is in many respects comparable to the learning of a language —theory is of little use, while practice is everything. Further, the greatest masters of a language are those who have learned it from their youth up. The rising generation has an opportunity of acquiring a practical knowledge of the metric system which will make its use easier when it becomes law, as it certainly will in course of time.

It is interesting to learn that the teachers of the University of Edinburgh are now training their students to the use of the metric system in prescribing. This means that in the course of a very few years a large number of medical men will be starting practice who will use this method to the exclusion of the old system, and it behoves those who have not given the subject much attention to make an effort to grasp its details. Fortunately transition is easy, at least so far as prescribing is concerned. One has only to visualize a gramme as 15 grains, a milligram as $\frac{1}{50}$ grain, a fluid drachm as 4 cubic centimetres, an ounce as 25 grammes, and a few other minor details, and the transition is as good as made. Metric doses can soon be mastered in this way. Take an ordinary prescription of quinine, sulphuric acid, and water. Five grains of quinine becomes 0·3 gm. (ten doses 3·0 gm.); eight minims acid. sulph. dil. is 0·5 c.c. (ten doses 5·0 c.c.); four ounces of water is 100 c.c. Such a mixture would contain ten doses of a dessertspoonful (10 c.c.).

There is no necessity to write gm. or c.c., and the decimal point may be replaced by a vertical line, as is taught at Edinburgh, thus:

Quininae sulph. - - - -	3	0
Acid. sulph. dil. - - - -	5	0
Aquam - - - -	ad 100	0

This is all that is necessary and it eliminates the risk of error due to an indistinct decimal point.

While the British Pharmacopoeia has adopted the metric system in its 1914 edition, the change has been clumsily effected, especially as regards doses. These ought always to be stated in fractions of a gramme, except in very small doses, which may be stated in milligrams. The Pharmacopoeia gives the dose of quinine sulphate as 6 to 60 centigrams, which conveys no assistance, whereas had it been 0·06 to 0·6 gramme the reader would readily visualize it as 1 to 10 grains. It is most unfortunate that our official publication does not deal with the matter more scientifically; had it done so we should by this time have been well on the way to the universal use of the metric system so far as medical and pharmaceutical practice is concerned.

ORIGINAL COMMUNICATION.

Therapeutics in the Making: An Outline of its History.

By John D. Comrie, M.A., B.Sc., M.D., F.R.C.P.

Lecturer on History of Medicine at the University of Edinburgh; late
Consulting Physician to the Forces in North Russia.

(*Continued from page* 146.)

WITH the better knowledge of the body which followed upon the work of the Italian anatomists in the 15th and 16th centuries, the researches into its mechanical principles by Harvey and Borelli during the earlier half of the 17th century, and above all the discoveries of its fine structure with the help of the newly invented microscope by Malpighi, Leeuwenhoek, and others in the latter half of that century, conceptions as to the nature of disease and remedies greatly changed. The general idea of diseases hitherto held had been that they originated from too great dryness or moisture, coldness or heat, laxity or stringency of the tissues, or too great or too small amount of one or other of the humours. Accordingly the aim in therapeutics had been to supply remedies possessed of the contrary properties to those supposed to characterize the disease in question. When the astonishing rate at which the circulation proceeds had once penetrated medical thought, the humours slowly percolating through the tissues were seen to be of less importance; and when the complex structure of the different tissues was demonstrated, disease was shown to be a more complicated matter than had been supposed. Men's minds, therefore, turned towards finding remedies which should be specific antidotes to each disease. One of the earliest of these 'specifics' was mercury, which, early in the 16th century, almost immediately after the wide spread of syphilis, was found to be an excellent remedy against this disease. It was administered at first by inunction as prescribed (1514) by John of Vigo, the famous surgeon, and as the disease was supposed to be carried off in the saliva, the aim was to produce a copious salivation. This idea persisted until quite recent times. Later calomel was found to be of equal use; and in the 18th century Gerhard van Swieten, the founder of the Viennese Medical School, introduced the liq. hydrargyri perchloridi.

Another remedy which further encouraged the doctrine of 'specifics' was cinchona bark. Prior to the 17th century malaria had been called the 'opprobrium medicorum' because of the uselessness of medicine to stop intermittent fevers. In 1640 the Countess Ana of Cinchon, having been cured of malaria some years previously in Peru by the use of bark employed by the Indians, introduced its use into Spain. Parcels of the bark were brought back to Europe by Jesuit missionaries and distributed in malarious districts. The value and dangers of this cinchona, or Peruvian or Jesuit's bark, were at first much disputed, and its usefulness in malaria was placed on a firm basis (1676) by Sydenham more than by any other man. Quinine was isolated from the bark by Caventou and Pelletier in 1820.

Another drug with which the name of Sydenham is directly associated is laudanum. Poppy juice had of course been used from the dawn of recorded medicine, but Sydenham was the first to produce a liquid laudanum. This had the following composition: opium, 2 ounces; saffron, 1 ounce; cinnamon and cloves, of each 1 drachm; canary wine, 1 pint. Until very recent times, Sydenham's laudanum was a common formula of the shops. The name of Sydenham's pupil, Thomas Dover, who was later a celebrated buccaneer of the Spanish Main, is associated with another preparation of opium, the compound ipecacuanha powder, which he invented. Dover, by the way, was wont to prescribe this powder in doses of 40 to 70 grains, and expressed great annoyance at the London apothecaries who advised their customers to make their wills before taking it! Morphine was isolated by Sertürner in 1806, being the first important active principle to be separated; and in 1831 William Gregory, Professor of Chemistry in Edinburgh, published his important discovery that hydrochlorate of morphia can be extracted from opium by water; the successful commercial exploitation of this discovery has been the main factor in making Edinburgh one of the chief drug manufacturing centres of the world.

Another drug which the modern world owes to the Incas of Peru is coca, used originally as a stimulant, and of which the alkaloid cocaine with its synthetic imitations has proved invaluable as a local anaesthetic. Foxglove leaves had long been used in popular medicine as a remedy for dropsy, and from 1776 Dr William Withering, who was told the secret by an old woman of Gloucestershire, introduced the remedy into medical practice. The distinction between cardiac, renal, and other forms of dropsy was not then recognized, and Withering was disappointed to find that hydrocephalus and 'ovarian dropsy' did not yield to the drug. The glucoside digitalin was isolated about the middle of the 19th century, and one of the first to describe its therapeutic uses was Sir Robert Christison in 1855. The mode of action of this most valuable drug has been placed on a still more precise basis in recent years by the researches of Mackenzie and Cushny using special modern instruments.

While opium and similar drugs had been, up till the 19th century, the universal remedy for pain, about 1800 the great discovery was made by Sir Humphry Davy that inhalation of nitrous oxide could for a brief space of time abolish both consciousness and suffering. The discovery of the anaesthetic properties of ether by Morton in 1846 and of chloroform by Simpson in 1847 need no more than mention here. These discoveries, together with the introduction of antiseptics, begun by Lister in 1865 and followed by the aseptic methods of his successors, have produced a revolution in surgical practice as well as in several other departments of medicine.

The theory of producing immunity in the body against outside influences has called into existence a great number of therapeutic procedures. Although the principle of active immunity was known to the ancients and examples mentioned by Pliny and others, the practice virtually began about 1720, so far as disease is concerned, with the introduction from the East by Lady Mary Wortley Montagu of inoculation to anticipate smallpox. Jenner's adoption (1796) of the popular tradition that cowpox was a preventive of smallpox proved in safety and in efficiency to be an immeasurably great improvement upon this process. It seems a natural step to proceed from vaccination against smallpox to the production of vaccines against other diseases, but this does not appear to have been taken for nearly a century, till Pasteur introduced his vaccine against anthrax in 1881. The later history of vaccines against tuberculosis, typhoid fever, plague, coryza, etc., is well known. Pasteur's theory of attenuated viruses, upon which vaccination depends, was extended to the science of toxins and antitoxins by von Behring, who showed (1890) that the serum of animals immunized against attenuated diphtheria toxin can be used as a therapeutic inoculation against diphtheria in other animals ;

this led to the production of diphtheria antitoxic serum on a great scale and to the production of similar antitoxic sera against tetanus, streptococcal infection, etc.

About the middle of the 19th century the frequent existence of a relation between the chemical constitution of remedies and their pharmacological action came to be recognized and this has led to experimentation with a great host of new synthetic drugs and the retention of many which have proved useful. Among these may be mentioned acetyl-salicylic acid, acriflavine, amyl nitrite, barbitone, hexamine, phenacetin, phenolphthalein, thiosinamin, etc. The idea of a selective affinity between chemical substances and protoplasmic matter in the body or in micro-organisms also formed the basis for the researches of Ehrlich which led to the production of salvarsan (1910) and similar compounds.

Another branch of modern therapeutics which has advanced with the development of higher chemistry is that associated with the secretion of the ductless glands. This was adumbrated in the vague ideas of the ancients regarding excess or defect of the humours in the production of diseases. After Harvey's discovery the blood came to be regarded as a mere carrier, and experiments were profusely made to transfuse the old with blood from younger persons, and to infuse the blood of animals and even foreign substances like wine. The practice of blood-letting which had come down from the Middle Ages as a commonly employed remedy and preventive of disease, practised within reasonable limits, became extravagant both as regards the universality with which recourse was had to it and the great amount of blood withdrawn. This universal treatment by depletion was humorously satirized by Molière and others, but continued under the teaching of Broussais of Paris and Gregory of Edinburgh as a necessary 'anti-phlogistic' measure till it was finally overthrown when Hughes Bennett showed (in 1865) the great mortality caused by bleeding in pneumonia. The first light upon the important substances which the blood distributes in minute amount through the body was given by discoveries in connexion with the thyroid gland dating from 1850. It was noted that this gland was absent in cretins, and that its removal in animals caused similar symptoms and death; later in the seventies Gull and Ord described the adult form of cretinism known as myxoedema; and in the eighties Kocher and Horsley showed that this was produced after removal of the gland from human beings or animals; after this it was a natural transition to Horsley's implantation of the gland to prevent myxoedema, and to the subsequent administration about 1892 of extract or powder of the gland by various other observers. Experiments with the substances secreted in the adrenals, pituitary, and other glands followed and have provided a group of new and powerful remedies. Still more recently, clinical observation and chemical investigation have shown the importance of the colloidal state in certain remedies, and the demand that is made by certain tissues for special food substances, the deprivation of which leads to the so-called vitamin-deficiency diseases.

The importance attached to mental processes in the healing art during the early days of medicine has been already mentioned. A revival of this was inaugurated in the 19th century by Laycock in Edinburgh and Charcot in Paris who greatly improved and regularized the treatment of hysterical manifestations. Other observers developed the process of hypnotism as a therapeutic measure. The hypnotic state has been known among the yogis of India for many ages, was demonstrated in the lower animals by Athanasius Kirchner in 1680, and brought into scientific prominence by F. A. Mesmer, a physician of Vienna, in the end of the 18th century. In France the method has been considerably used in therapeutics, but in Britain there has always been great prejudice against it, partly because of the amount of fraud with which it has been associated, and partly probably because the northern peoples are temperamentally less suited to its application. Esdaile, for example, practising in a Government hospital at Calcutta, was able by suggestion to anaesthetize Indians for amputations and other major operations, but found that the method, when shorn of its Eastern glamour and applied in Scotland, was practically valueless. In the hands of the modern psycho-analyst the method is practised with much the same indiscriminate zeal as blood-letting showed a century ago.

The therapeutic use of electricity is one of considerable historic interest. William Gilbert, Physician to Queen Elizabeth and James I., is not only celebrated among physicists for his early researches on terrestrial magnetism, but he described the phenomenon of rubbing amber upon fur, bestowed the name 'electricity' on this new force, and recommended it in therapeutics. A century and a half later, the phenomena of electricity were further investigated by Benjamin Franklin, who recommended static electricity (Franklinism) in the treatment of nervous diseases; and by Galvani (1792). The well-known popular reverence for electricity and frequent desire for its application in the most diverse conditions is probably a tradition of the recommendation given to it for some fifty diseases as 'the nearest an universal medicine of any yet known in the world' by John Wesley in 1760. Its scientific use in diagnosis and treatment of nervous diseases is really due to the work published by Duchenne in 1855. High frequency currents were introduced by d'Arsonval into therapeutics in 1892, and medicine owes a very great debt indirectly to electricity for the vast field in diagnosis and treatment by radio-activity opened up first through the discoveries of Roentgen in 1893.

THERAPEUTIC PROGRESS.

ABSTRACT REVIEWS OF CURRENT LITERATURE.

ANAEMIA.

Pernicious Anaemia.—In a lecture on 'Pernicious Anaemia and Septic Anaemia,' W. Hunter[1] recognizes two forms of severe anaemia. The one is the great haemolytic disease termed idiopathic or pernicious anaemia; the other is a very common anaemic condition, non-haemolytic in its nature, which he terms septic anaemia. The patient who presents the picture of desperate anaemia (termed 'pernicious') is really in the grip of both these forms; each is capable of killing him, and the two combined are absolutely mortal. When the septic anaemia and its causes are removed, the great haemolytic disease shows itself in its true uncomplicated characters and course, and there are then great possibilities of recovery. The earliest and chief diagnostic feature of pernicious anaemia (or, as Hunter prefers to call it, glossitic anaemia) is a peculiar form of sore tongue. Onset is seasonal—July to September—and sudden, and the tongue at intervals becomes tender and shows patches of redness and vesicles, or it may become extremely inflamed, looking like raw beef. Septic anaemia arises from long standing sepsis, chiefly streptococcal, arising usually from the teeth. Removal of all the teeth, even those apparently sound, is essential; and this procedure, with suitable treatment to overcome the sepsis, leaves the glossitic anaemia in a condition capable of being cured. The lecture, which is given *verbatim*, should be read in the original.

Treatment by means of hydrochloric acid is described by V. Bie,[2] who cites a case of pernicious anaemia with gastric achylia and enteritis which yielded to this method. He recalls Faber's treatment by means of kephir (a preparation of milk acted upon by a ferment derived from *B. caucasicus*), in which the organism of kephir displaces the harmful organisms in the intestine. These latter are caused by deficiency of hydrochloric acid, and Bie argues that it would be preferable to restore the hydrochloric acid to the stomach. His method was to introduce once daily by means of a thin sound a solution of HCl of about the same dilution as the natural acid of the stomach. He began with one c.c. HCl (25 per cent.) in 250 c.c. water; next day 2 c.c. in 500 c.c. was given, followed each day by increasing and then diminishing strengths, thus: 3 : 500; 5 : 500; 6 : 500; 7 : 500; 8 : 400; 6 : 300; 5 : 250, the condition of the patient being the guide in determining the dilution. This was continued for seven or eight months. In the early part of the treatment the diarrhoea ceased and constipation supervened, which had to be combated. Later the haemoglobin and red corpuscles increased, and after two months these were normal. The acid was eventually discontinued and the patient has since remained well, with normal blood.

S. A. Levine and W. S. Ladd[3] submit the results of a clinical study of 150 cases of pernicious anaemia, with special reference to gastric anacidity. In cases with proved diagnosis they found free hydrochloric acid in only 3 out of 107 cases in which an Ewald test meal (two rolls or slices of bread and 9 to 12 ounces of water) was analysed. Hence the absence of free hydrochloric acid is a factor of considerable importance in diagnosis. This was found to antedate the changes in the blood. Seven cases are cited in which the diagnosis strongly pointed towards pernicious anaemia, because they demonstrate the importance of questioning this diagnosis if free HCl is present in the gastric juice.

R. H. Zinck *et al.*[4] investigated the protective power of human serum against haemolysis by saponin and sodium oleate. Saponin is a haemolytic agent foreign to the body, while sodium oleate is one that is probably present in the body normally. They found that the serum of patients suffering from haemolytic anaemia showed a marked decrease in protective power as compared with the serum of normal persons and of persons not suffering from these maladies.

In dealing with the treatment of pernicious anaemia by means of splenectomy, J. M. Hitsrot[5] describes seven cases so treated. Three of these improved for periods varying from one to four years; three died within a year after operation; the remaining case was too recent to state the final outcome. He pleads for early operation, if operation is to be considered at all, as the early cases do much better than those in which splenectomy is done as a last resort.

Walterhöfer and Schramm[6] found that of 16 patients treated by splenectomy, only one survived for five years and two for two and four years. The others died soon after the operation. They have tried removal of the marrow from a long bone, with a view to regeneration of the bone marrow, and have found this method yield much more satisfactory results.

L. J. Unger[7] calls attention to the necessity in blood transfusion of using suitable unmodified blood. While the use of citrated blood is permissible in cases of haemorrhage, where the object is not merely to replace pathological with normal blood but rather to replenish the impoverished circulation, the case is different in diseases such as pernicious anaemia in which the blood is indicated for itself. Clinical experience shows that serious reactions have followed the use of citrated blood—chills, fever, and profound shock having frequently occurred, followed occasionally by death. In order to ascertain if these results were due to the modification of the blood used, Unger instituted laboratory experiments to investigate the difference between unmodified and citrated blood. Blood was obtained from normal individuals and subjected to tests, which are fully described, and which enabled him to arrive at the following conclusions :—

Biological tests demonstrate that the transfusion of unmodified blood is of far greater value than blood modified by the addition of sodium citrate.

Sodium citrate, even in the low percentage employed in a citrate transfusion, affects the red blood cells, rendering them more fragile. The value of such blood to a patient suffering from a haemolytic disease, such as pernicious anaemia, is lessened to that extent.

Sodium citrate diminishes the available quantity of complement in two ways : by its direct action on complement itself and by introducing into plasma an anti-complementary substance which inactivates complement. This substance is derived directly from the bodies of red blood cells.

Sodium citrate also reduces almost to nil the function of opsonins, and practically destroys the phagocytic power of white blood cells. Furthermore, the phagocytic index of the blood of various donors differs. Since complement and the phagocytic power are of prime importance in the protective action against pathogenic organisms, unmodified blood from a donor with high phagocytic index should be employed when attempting to combat local or general infections by means of transfusion. In selecting a donor, attention should be paid to the finer qualitative differences in the blood.

In a previous communication to the same journal,[8] Unger pointed out that donors can be grouped according to the quality of their blood, and that before transfusion it is desirable not only to see that donor and patient are of the same group, but to test the patient's blood directly against that of the prospective donor.

References.—1. *B.M.J.*, Mar. 18, 1922, p. 421. 2. *Lancet*, Apr. 1, 1922, p. 631. 3. *Bull. J. Hopk. Hosp.*, Aug. 1921, p. 254. 4. *Ibid.*, Jan. 1922. 5. *Annals Surgery*, Jan. 1922, p. 31. 6. *Arch. f. klin. Chir.*, Nov. 24, 1921, p. 794. 7. *Jour. Amer. Med. Assoc.*, Dec. 31, 1921, p. 2107. 8. *Ibid.*, Jan. 1, 1921, p. 9.

Iron and Allied Drugs.—The therapeutics of iron form the subject of an interesting review in the *Journal* of the Amer. Med. Assoc.[1] For some time, it is pointed out, a vigorous controversy raged as to whether the body is capable of absorbing iron in inorganic form and synthesizing it into the complex molecule of the blood pigment haemoglobin. Out of this discussion arose the fact that inorganic compounds of iron were of undoubted service in blood formation. Abderhalden has shown that iron is to some extent ionized in the alimentary tract in the course of the digestive process. In fact it matters little in what form the iron is administered: iron is liberated in inorganic form through alimentary reactions.

The normal human body contains at most only 3 gm. (45 grains) of iron, chiefly in the form of haemoglobin, and the daily need of this element must be small. Iron is contained in most diets, and the daily loss of 10 to 15 mg. ($\frac{1}{6}$ to $\frac{1}{4}$ grain) is easily replaced. The dose of iron preparations is always much larger, and one is inclined to think that iron has in reality some rôle as a haemopoietic; in other words, is iron a drug or a food?

G. H. Whipple *et al.*[2] report experiments on animals which show that iron given in the form of Blaud's pills has no influence on the rate of blood regeneration in secondary anaemia. On the other hand, suitable diet, such as lean beef or cooked liver, has a profound influence. Blood has been found to have a good effect in clinical practice, but these investigators find that haemoglobin, given by the mouth as dry powder, while it has a distinctly favourable effect, is not sufficiently potent to warrant its use in secondary anaemia.

More recently J. H. Musser,[3] of the University of Pennsylvania, observed animals which had been repeatedly deprived of small amounts of blood over various intervals of time, and which had thus been rendered anaemic. The type of anaemia so produced is similar to that met most frequently in practice. Iron was given in the form of equal parts of ferrous sulphate and sodium bicarbonate in quantities equivalent to 2 gm. (30 grains) of iron per day for a man. This failed to produce any constant alteration in the course of the experimental haemorrhagic anaemias.

All these facts raise the question[4] as to whether the iron supply is, after all, the foremost factor in blood regeneration. Haemoglobin is a complex molecule into which many chemical groups are built up, and the study of the pathology of the blood, and especially of haemoglobin formation, has suffered through the confusion of its problems with the iron question.

Closely allied to these researches is the recent work of E. Bürgi,[5] of Berne, on the relation between haemoglobin and chlorophyll. This was fully dealt with in our April issue, p. 137.

R. Samut,[6] of Malta University, contributes a note on the use of colloidal manganese in Hodgkin's disease. He describes two cases, a man aged 27, and a woman aged 22. Both cases were characterized by profound anaemia and glandular swellings. In the first case sodium cacodylate was tried but without apparent result; injections of colloidal manganese were then tried and the patient showed marked and continued improvement, the glands disappearing after three months' treatment. Unfortunately the patient succumbed after an operation for appendicitis some weeks after he had returned to work. The second patient showed improvement after the first few injections and is now normal. In each case three weekly injections (three injections weekly ?) were given, intramuscularly in the gluteal region. The injections were painless. The dose is not stated.

The value of *Germanium dioxide* was referred to in our January issue, p. 9. A further communication from Hammett, Nowrey, and Muller[7] confirms their previous findings. Injections of a sterile solution (0·4 per cent.) of this salt were followed by a marked and sustained rise in the number of erythrocytes in the blood which ranged from one to nearly five millions. The rise in the red cell count took place within a week, and after only two injections. Germanium dioxide tends to increase the coagulability of the blood. [Germanium dioxide, GeO_2, is a salt of the rare metal germanium. It is a white powder, only slightly soluble in water, 0·4 per cent. being a saturated solution at ordinary temperatures. It is freely soluble in alkalis.—ED.]

REFERENCES—1. *J.A.M.A.*, Feb. 18, 1922, p. 512. 2. *Amer. J. Physiol.*, Sept. 1920, p. 263. 3. *Arch. Int. Med.*, Nov. 1921, p. 638. 4. *J.A.M.A.*, *loc. cit.* 5. *Therap. Monats.*, Jan.-Feb. 1918; PRESCR., Apr. 1922, p. 137. 6. *Lancet*, Jan. 7, 1922, p. 17. 7. *Jour. Exper. Med.*, Feb. 1922, p. 173.

CHOLERA.

Saline Transfusion.—L. M. Chatterjee[1] gives particulars of treatment of cholera cases at his hospital in India, where he has adopted a modification of Rogers's method. At first a solution of sodium bicarbonate (120 grains in 20 oz.) is given by intravenous injection. This is followed by Rogers's hypertonic saline transfusion. The preliminary alkaline injection, Chatterjee finds, helps patients with lung trouble, and removes acidosis more quickly than is the case when the alkali is combined with the saline solution. Medicinal treatment comprises a powder every half hour consisting of calomel $\frac{1}{8}$ grain, camphor 2 grains, sod. bicarb. 10 grains. Permanganate is not given, as it tends to increase vomiting. The usual cardiac tonics, etc., are given. Chatterjee has observed that during transfusion peculiar vasomotor disturbances occasionally set in, especially in bad toxaemic cases, which prevent the saline solution from running into the vein any further. This condition can be rectified by the immediate hypodermic injection of one c.c. pituitary extract.

Prophylactic Vaccination.—The Committee on Anticholera Vaccination of the Philippine Health Service[2] have issued a report of which the following is a résumé : Cholera vaccine produces less reaction than typhoid vaccine, and the second injection less reaction than the first. A vaccine should be used in which the bacilli have been killed by heat at 60° C. for half an hour. The vaccine should be carbolized and should contain 1000 millions per c.c., this being the dose for healthy adults in that country. In field vaccination on a large scale one such injection will suffice, but where practicable it is better to give two injections of from 500 to 1000 millions. Every encouragement should be given to physicians to use the vaccine, and the public should be enlightened by means of suitable propaganda. The Committee further urge that records and observations made by physicians throughout the islands should be made accessible to them in view of future reports.

A. Besredka[3] reports favourably on cholera prophylactic vaccine, which proved most successful in the epidemic at Tokyo in 1920. As the vaccine acts locally on the intestine, he thinks the best method of administration is by the mouth.

REFERENCES.—1. *Indian Med. Gaz.*, Jan. 1922, p. 10. 2. *Bulletin of Philipp. Health Service*, per *New York Med. J.* 3. *Médécine*, Dec. 1921, p. 180.

CONSTIPATION.

H. A. Cheplin and J. I. Wiseman[1] report on the value of *Bacillus acidophilus* milk in chronic constipation in eight patients on whom it was tried. They employed living 24-hour cultures in the form of 500 c.c. of the milk product reinforced with 100 gm. lactose daily in two equal doses. No special diet was enjoined, and no cathartics or laxatives were taken by the patients during the experimental period. In all cases the effect on the constipation was quite apparent, daily evacuations being recorded in most cases. In some of the patients the benefit was not prompt, but it became evident as soon as the amounts of *B. acidophilus* milk and added lactose were doubled. In a few days the usual mixed bacterial flora of the stools gave place to a more simplified form largely represented by *B. acidophilus*. [*Bacillus acidophilus* is a non-motile, non-pathogenic bacillus found in human milk and in the excretory duct of the breast. It occurs also in the stools of breast-fed children.]

J. Garcia del Diestro[2] recommends ipecacuanha in the constipation of infants where no direct cause can be found for the gastro-intestinal derangement. He gives to infants under one year tincture of ipecacuanha, 6 to 10 drops daily divided into two or three doses, or else one or two drops ten or fifteen minutes before each feed. Given in this way it soon restores the tract to normal without doing any harm or causing nausea or vomiting. [Tincture of ipecacuanha of the Continental pharmacopoeias is 10 per cent., *i.e.*, about double the strength of the vinum ipecac. of the B.P.]

During the last few years several cases of urticaria following the use of phenolphthalein have been recorded ;[3] one of these is referred to in our February issue, p. 47. Tablets of this substance are a popular remedy for constipation, and occasionally such idiosyncrasy is observed.

Most of these outbreaks resemble erythema perstans in character, but one recently reported by E. F. Corson and D. M. Sidlick[4] was clinically indistinguishable from the common type of urticaria. F. Wise and E. W. Abramowitz[5] also report five cases in which a peculiar polychromatic eruption was provoked, with bullous vesicular lesions of the mucosae and genitals. The pigmented areas persist for months, or even for years, flaring up after ingestion of the drug usually in the same spot each time. The eruption resembles in many respects those produced by antipyrin and arsenobenzol.

A. N. Donaldson[6] made a series of experiments on human subjects with a view to determine how far the well-known effects of constipation are due to auto-intoxication. While he does not deny the existence of auto-intoxication in some cases, he is of opinion that in the majority of cases, especially those that obtain temporary relief after an enema, there is no intoxication. The symptoms complained of may be produced by simply plugging the rectum; this has an effect on the blood pressure, which in turn produces certain endocrine disturbances. Much of the trouble is due to auto-suggestion, the result of consciousness of the presence of faecal matter in the lower bowel, consequent nerve strain producing endocrine depletion.

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DIPHTHERIA.

The Schick Reaction.—At a meeting of the Royal Society of Medicine on Jan. 28th,[1] S. M. Copeman reported on the investigation undertaken at the Mitcham Schools of the Holborn Guardians. Twenty cases of diphtheria had occurred between March and August 1921. With the consent of the Guardians the children underwent the Schick test, after which the children were examined daily for a week and occasionally for about a month. The number of children tested was 329, of whom 102 proved positive, *i.e.*, susceptible to diphtheria. These latter were immunized by means of toxin-antitoxin injections. One child, evidently very susceptible, showed a severe reaction and had to be removed to isolation quarters. A proportion of the children exhibited a bright red rash, but otherwise remained well and normal. A. J. Eagleton gave details of the bacteriological examination of these children.

A. T. Glenny emphasized the necessity for great care in the preparation of the toxin-antitoxin mixture for active immunization. R. A. O'Brien said that of 300 children tested by him, 31 per cent. gave a positive result, a figure closely approximating that obtained by Park and Zingher in New York. Carriers usually gave a negative reaction; when their reaction was positive they usually were incubating the disease and developed it very soon after. General reactions from the test were practically *nil*; local reactions were common but caused very little interference with the child's activities.

T. E. Dickinson[2] gives a record of 11200 cases in which the Schick test was performed. He used B. W. & Co.'s toxin, 0·2 c.c. of which is equal to $\frac{1}{50}$ M.L.D. (*i.e.*, fatal to a guinea-pig of 250 gm.), and he describes the technique. Readings were taken 24 hours, 72 hours, and 10 days after the test. Variations observed were: delayed reaction, a considerable number taking over 24 hours to show, some as much as 4 or 5 days; abnormal pigmentation, massive scaling, and vesiculation also occurred in a few cases. The greatest number of + results were obtained in children of 3 to 4 years (the age incidence in 2711 cases of diphtheria recorded by the Children's Hospital, Berlin, in 1890-97 was 2 to 5 years: this shows the reliability of the test). The percentage of pseudo-reaction above 15 years was twice that under 15. The effect of other diseases on the Schick test was as follows: scarlet fever reduces the percentage of + reactions; typhoid and erysipelas raise the number of ψ reactions; puerperal fever lowers the ψ reaction. Vaccination causes a rise in the percentage of ψ reactions. In infancy the percentage of + and ψ reactions is diminished. Members of the same family have a tendency to agree as regards + or − reaction, but not as regards ψ reaction.

A valuable article on the principles and practical application of the Schick test is given by A. J. Eagleton.[3] This should be studied by those desirous of detailed information on these points. He describes the principles on which the reaction is based, the technique of the injection, the reading of the reaction, the results obtained, the reliability of the test, active immunization by T.A.T. (toxin-antitoxin), and the practical application of the test and immunization. His summary of facts may be given:—

1. A negative Schick reaction, in children under 6 months and even up to 2 years of age, may indicate passive (maternal) immunity, and does not guarantee lasting freedom from diphtheria.

2. The majority of children from 2 to 4 years of age give positive Schick reactions. Above this age period the percentage of susceptibles gradually falls.

3. Passive immunity by antitoxin is conferred rapidly, and rapidly passes off.

4. Active immunity by T.A.T. is slowly developed and lasts many years.

5. Active and passive immunity cannot be conferred simultaneously. In order to protect a family, school, ward, etc., against diphtheria, all children from 6 months to 4 years should be immunized with T.A.T. Persons above this age should first be tested, and those giving a + reaction should be immunized. After three months those who have received the T.A.T. should again be tested, and any still giving a + reaction should receive a further dose of T.A.T. After two or

three weeks this remnant should again be tested, and if necessary treated with T.A.T. until all are immune. In New York this method is being systematically attempted, and it is urgently called for in connexion with schools, hospitals, etc., and for the protection of medical and nursing staffs. In an acute epidemic active immunization with T.A.T. has no place, on account of the time required to develop immunity.

A. Zingher[4] contributes an article dealing in some detail with the standardization of diphtheria toxin for the test and of heated diphtheria toxin for the control, and describes methods for the dilution of the toxin. His article is an exhaustive one and is summarized thus:—

1. Standards for official control of Schick outfits are strongly advisable.

2. Careful standardization of Schick outfits in guinea-pigs necessitates that there should be at least one M.L.D. in each individual outfit. Such an outfit would be sufficient for from 35 to 45 tests.

3. Outfits for the Schick test sufficient to make five or ten tests cannot be tested for accuracy except in the human being.

4. Undiluted bulk toxin, accurately and carefully diluted, is most suitable for the testing of large numbers of individuals in schools, institutions, hospitals, clinics, etc.

5. Two methods are given for the dilution of bulk toxin.

6. The dose of toxin for the Schick test is $\frac{1}{40}$ M.L.D. in 0·2 c.c. This amount has been found to be the equivalent of $\frac{1}{50}$ M.L.D. in 0·1 c.c. The larger amount of the more diluted toxin is easier to inject, and the results are more likely to be accurate. The positive Schick reactions also in susceptible individuals who have not even a trace of antitoxin are not likely to be so severe and show the superficial necrosis of the skin noted with the more concentrated dilution recommended by Schick.

7. The dose of heated toxin for the control test has, in addition, a 20 per cent. excess to allow for slight deterioration by heating of the reacting autolysed protein.

8. Too much emphasis cannot be laid on the accurate dilutions of the toxin for the Schick test and for the control test. Such dilutions represent the very foundation for any successful attempt in using the Schick test in the control of diphtheria.

J. Meyer,[5] of Chicago, has been making observations in that city since 1918, in regard both to the Schick test and to immunization with toxin-antitoxin mixture. The toxin and control used in the Schick test were prepared by the Chicago health department. Meyer's results lead him to the conclusion that the Schick test is a means of testing the immunity against diphtheria in those who possess a natural immunity and those who acquire an active immunity as a result of injection with diphtheria toxin-antitoxin. The duration of immunity conferred by injection of toxin-antitoxin mixture, as determined by the Schick test, extended for a period of forty-four months in 94·4 per cent. of the cases, for twenty months in 83·5 per cent., and for sixteen months and five months in 97·5 per cent. The incidence of diphtheria has decidedly diminished since injection of diphtheria toxin-antitoxin has been adopted as a routine measure.

REFERENCES.—1. *Lancet*, Feb. 4, 1922, p. 227. 2. *Ibid.*, Feb. 18, 1922, p. 312. 3. *Guy's Hosp. Gaz.*, Feb. 18, 1922, p. 67. 4. *J. Amer. Med. Assoc.*, Feb. 18, 1922, p. 490. 5. *J.A.M.A.*, Mar. 11, 1922, p. 716.

EPILEPSY.

General.—E. A. Tracy[1] deals with the diagnosis and treatment of incipient epilepsy. A study of the phenomena in the early stages of the disease has led him to conclude that incipient epilepsy may be diagnosed when, in a case presenting the history of fainting spells, attacks of dizziness, sudden pallors, and periodical irritability, there are found present: (1) A sympathetic hypertonia; (2) unbalancement of the vasoconstriction reflexes; and (3) chronic vasoconstriction spots. The histories of three cases so diagnosed are described.

With regard to treatment, Tracy argues that a hypertonia of sympathetic fibres might be overcome by means of a sympathetic paralysant. Such a drug he finds in *Oenanthe crocata*, a colloidal preparation of which was given with complete success in the three cases described. [*Oenanthe crocata*, or water dropwort, is a poisonous British umbelliferous plant. Its toxic principle is believed to be a neutral resin, which causes convulsions by acting on the spinal medulla.—*Extra Pharmacopoeia.*]

C. W. Vining[2] traces the relationship to the epileptic state of 'bilious attacks' and certain other morbid phenomena occurring in the child and adolescent. Such conditions in some cases are an expression of a potentially epileptic nervous system. The secret of the prevention of epilepsy probably lies in the patient's preceding generation or generations, and to attempt its prevention in the child is at least more satisfactory than to attempt to produce a cure when epilepsy has fully developed. The recognition, therefore, of the possible relationship of these phenomena to the epileptic state and their active and prolonged treatment, together with suitable control of the child's life, may go a long way in the prevention of the development of the convulsive habit.

Luminal.—A review of the literature dealing with the use of luminal (phenyl-ethyl-barbituric acid, known in France as gardénal) is given by L. Cheinisse.[3] He refers to Ducosté's warning that while it acts well on the convulsive element in epilepsy, it strikes too strongly. While it arrests the seizures, it also checks the normal play of the nerve centres and is liable to produce a physical and mental torpor. Ducosté combats this tendency by giving along with it very small doses of belladonna or caffeine. Golla's experience is also referred to: in 36 out of 125 epileptics either no benefit was obtained from luminal or the epilepsy was aggravated. Salomon reports a death in status epilepticus six days after sudden suspension of luminal, which had been given with benefit for four months. Certain intestinal symptoms attributed by the patient to the luminal caused him to refuse to take it, and seizures returned the day after the drug was suspended.

J. A. Jackson and G. B. M. Free[4] state that luminal in doses of 0·1 gm. (1½ grain) daily reduces the convulsion curve for the time being, but later this effect is lost and there is a secondary elevation of the curve. An increased dose again lowers the incidence of the fits, but this is followed later by another secondary rise. Complete withdrawal is followed by a distinct relapse, which in two cases resulted in severe seizures, status epilepticus, and death. The authors are of opinion that the drug does not cure ; its prolonged use is dangerous and its withdrawal requires great care. Its routine use, therefore, is not to be recommended, because tolerance necessitates higher dosage, while its withdrawal means a return of the seizures.

Endocrine Glands and Epilepsy.—S. R. Leahy[5] deals with epileptiform manifestations in endocrinic disorders, describing a number of cases in which these conditions occurred simultaneously. There appears to be a definite relation between deficient ovarian secretion and epileptiform attacks, and a similar relation between such attacks and deficiency of the pituitary secretion. Practically all his cases showed more than one glandular involvement. Suitable gland treatment in most cases relieved the epileptic symptoms ; where this failed it was concluded that the error lay in attributing the condition to the wrong gland. Leahy thinks that in every case of epilepsy transitional forms of various endocrinic disturbances should be looked for.

P. S. Lowenstein[6] found that of 16 cases, representing all types and degrees of epileptic convulsions, five were apparently benefited by hypodermic administration of extract of whole pituitary gland. No cases showing typical epileptic constitution were so benefited, and in no case did the usual physical signs referable to the hypophysis offer any indication as to the probable result of the treatment.

L. P. Clark[7] draws attention to the benign fainting attacks, often present in rapidly growing adolescents, which at first simulate *petit mal* epilepsy, though they are distinguished from this condition by the absence of epileptic disorder. These attacks are part of the obscure clinical picture of dyspituitarism in which there appears to be an excessive functioning of the anterior lobe. Low blood pressure, slow pulse, vasomotor ataxia, and defective muscular and skeletal displacements are also present, and there is frequently slow mental development. Treatment is physical, with administration of specific gland substance.

Removal of one of the adrenals (see Prescr., Feb., p. 59) has been tried by Schmieden and Peiper[8] in seven cases without permanent benefit. The age of the patients varied from 6 to 23. In one of the women menstruation became irregular and scanty afterwards, while in another menstruation reappeared with normal regularity after suspension for eight years. In both these cases the seizures appeared in connexion with the menses. They also cite a case in which adrenalectomy was performed with good results.

References.—1. *Med. Rec.*, Mar. 11, 1922, p. 410. 2. *Lancet*, Jan. 21, 1922, p. 122. 3. *Presse méd.*, Jan. 14, 1922, p. 42. 4. *Therap. Gaz.*, Dec. 1921, p. 837. 5. *New York St. J. Med.*, Jan. 1922, p. 8. 6. *Amer. J. Med. Sc.*, Jan. 1922, p. 120. 7. *Ibid.*, Feb. 1922, p. 211. 8. *Arch. f. klin. Chir.*, Nov. 24, 1921, p. 845.

EYE DISEASES.

P. A. Harry, M.D., D.P.H.

Ophthalmic Symptoms of Wood Alcohol Poisoning.—Restrictions in the use of ethyl alcohol in various parts of the world have led in some places to the consumption of substitutes. One of these is methyl alcohol or wood spirit, CH_3OH, which has attracted considerable attention on account of its poisonous properties, particularly its action on the ocular tissues.

S. L. Ziegler[1] deals with its use as an adulterant and gives tests for its recognition and quantitative estimation. Lethal action may develop by ingestion, by inhalation, or by cutaneous absorption. A single teaspoonful has been known to cause blindness and an ounce to cause death. Inhalation of the fumes may be followed by blindness, this form of poisoning being more chronic and insidious, while many cases of blindness have resulted from cutaneous absorption.

The ocular symptoms vary within certain limits, vision being seriously impaired. Blindness may be early, sudden, and complete. At the end of a month there may be temporary or permanent recovery. A history of variable vision associated with gastro-intestinal symptoms is typical enough to lead one to suspect wood alcohol. The objective symptoms are : sluggish dilated pupil, which may or may not react to light and convergence ; scleral congestion ; deep pain in the globe ; tenderness on pressure ; paralysis of one or more of the extra-ocular muscles with diplopia. The optic disk shows papillitis, retrobulbar neuritis, and sudden sclerosis. The author believes that a profound injury of the pituitary body is the primary and fundamental lesion. The fields of vision usually reveal a concentric contraction for both form and colour. Central scotomata are often present but not always permanent. Occasionally both fields and central vision are preserved in spite of the apparent sclerosis of the nerve head.

The poison is eliminated through the lungs, skin, kidneys, and alimentary tract, the remainder becoming oxidized into formaldehyde and formic acid. Acidosis is a constant symptom of the early stages. This should be overcome by the early administration of alkalis. Small doses of sodium bicarbonate by mouth and by enteroclysis will be found useful. Calcium chloride has given good results. Emesis should be effected by mustard or apomorphine, and gastric lavage performed. Ziegler has not had much success from the use of strychnine. To revascularize the disk he advises negative galvanism, high voltage and low amperage being used. The current is passed for ten minutes, and is applied directly to the eye.

E. Jackson[2] points out that the salient symptom of methyl alcohol poisoning is blindness resulting from optic nerve atrophy. The earlier period of intoxication may show no visual disturbances. Transient insensibility may be followed by recovery without impairment of vision, or the symptoms may be delayed in type, and in a few days after apparent recovery severe gastro-intestinal irritation may set in with rapid loss of sight. Complete blindness may last for a few days, after which vision becomes restored. A secondary attack of blindness may follow in a few weeks, and this is usually permanent and incurable. Optic atrophy appears late and there is blurring of the disk edges. In the early stages there is only congestion of the disks. The fields of vision may show large central scotomata early ; later there is great irregularity and concentric narrowing. Treatment includes hot pack, Turkish bath and pilocarpine sweats, free ingestion of water, venesection, and spinal puncture. Potassium iodide may be tried, also intravenous injections of sodium bicarbonate and stimulation of respiratory excretion. Efficient emesis in the early stages may prevent death or blindness, but it is rarely possible to get the patient in this stage. The prognosis is always grave. Idiosyncrasy plays a large part in the condition, and what might be an innocuous dose for one person may be fatal for another. Violent gastro-intestinal symptoms may develop late in the condition as a result of toxic affection of the nerve centres.

Senile Cataract.—Henry Smith[3] discusses the aetiology of this condition. Cataract is prevalent in the plains of North-West India, where the diet is chiefly wheat, maize, and peas with fats. It cannot be said to be a starvation disease, and it is doubtful whether the cause is due to exposure to actinic rays. There are black sand-like particles in the periphery of the lens, with a few opaque peripheral striae. In persons under 30 the appearance is that of small oil droplets in the lens. One case of early cataract treated with injections of cyanide of mercury (1 : 4000) improved considerably. A 6/12 vision often recovers to 6/6, although dead tissue does not disappear. The author has tried other methods such as an eye bath of potassium iodide and subconjunctival injections of iodides. The good result is due to the hyperaemia produced. Smith also deals with the pathology of early senile cataract, discussing the question whether the disease is due to defective elimination of waste or to atheromatous changes in the channels carrying nourishment to the lens. He inclines to the opinion that it is due to a pathological condition of the cells in the ciliary region.

Dacryocystitis.—Lemoine and Valois[4] recommend treatment by nascent iodine of sacs, the excision of which is not indicated. After instillation of cocaine and digital expression of the sac contents, a ten per cent. solution of potassium iodide is injected twice or three times by the puncta ; after this a small quantity of hydrogen peroxide is injected, and the conjunctival sac washed out with boiled water. The quantity of iodine liberated is not sufficient to cause irritation.

Episcleritis.—H. L. Sinskey *et al.*[5] record a case of metabolic episcleritis which resisted all the usual forms of treatment. There was no aetiological agent to account for the condition. They advised the patient to cut off all carbohydrates (cereals, potatoes, bread, and sugar) and to reduce the fat intake, allowing, however, moderate amounts of protein and carbohydrates of the vegetable and fruit type. It was noticed that any deviation from this diet was followed by recurrence ; also that after the patient had had an attack of tonsillitis and an operation for paranasal sinus disease, relief of the symptoms was manifest for over a week, due in the authors' opinion to restriction of diet. They advise further study of the cause and treatment of varieties of episcleritis of obscure origin, and they emphasize the relation of diet to this condition.

Optic Neuritis.—Stanley E. Denyer[6] reports the case of a young woman, convalescent from influenza and suffering from papillitis, who had no perception of light in the right eye and with the left could count fingers at one foot only. Another symptom was headache, frontal and temporal. There was no ear trouble and no evidence of cerebral tumour, abscess, or syphilis. The Wassermann reaction of the cerebrospinal fluid was negative, and the fluid itself was clear. There was a trace of albumin in the urine. The patient recovered her sight in about four weeks, the treatment being a mixture containing 5-grain doses of hexamine. The author quotes other sources to show that the chief causes of infectious optic neuritis in order of importance are influenza, syphilis, rheumatism, malaria, typhus fever, measles, whooping-cough, diphtheria, polyneuritis, smallpox, beri-beri, erysipelas, scarlet fever, tuberculosis, typhoid fever, gonorrhoea, and relapsing fever. He is of the opinion that papillitis and retrobulbar neuritis are due to toxins rather than to the organisms themselves.

Trachoma.—The 'Sculco' treatment of trachoma is described by G. A. la Jerba.[7] The method consists in application to the everted lids of a vegetable ferment extracted from *Nepeta citriodora* to which are added resins and glucosides from *Thymus serpyllum* and *Salvia officinalis.* The two last-named stimulate phagocytosis and increase the microbicide effect of the ferment. The combination is diluted by an indifferent vegetable powder. Non-recent forms of trachoma with pannus respond best, and the method is of little use in the early forms or papillary variety. J. B. Story[8] records the case of a girl of 10 with severe trachoma, which was successfully treated by this method.

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NEW REMEDIAL AGENTS.

Flavine in Skin Diseases.

THE Finsen Institute at Copenhagen has for some time past been employing the acridine dyes in the treatment of skin affections with considerable success. According to A. Kissmeyer (*Ugesk. f. Læger*, per *Med. Sci.*, Apr. 1922, p. 22), trypaflavine (acriflavine) has been found useful in suppurating conditions of the skin, such as sycosis barbae, folliculitis, small perifollicular abscesses, boils, Bockhart's impetigo, impetigo contagiosa, seborrhoeic abscesses in the axilla, and secondary infections such as those commonly seen in varicose ulcers. It is also extensively used in weeping eczema, and after operations a solution in alcohol is used to paint the skin as a preventive of infection. A 2 per cent. preparation known as 'trypaflavin-dermophil' has taken the place of zinc ointment as a dressing in cases where the Finsen treatment of lupus has provoked a severe reaction.

S. Werner (*Münch. med. Wochenschr.*, May 28, 1920, p. 637) uses a solution of acriflavine in alcohol (0·5 to 1·0 per cent.) in all forms of impetigo and for the early treatment of eczema crustosum. He finds it specially useful in the pyodermia of children. Henrichsen (*Berlin. klin. Woch.*, 1919, p. 852) uses a solution containing acriflavine 5 gm., glycerin 2·5 gm., and alcohol to 50 c.c.

The Cyanine Dyes as Antiseptics.

The cyanine dyes comprise a group of quinoline derivatives, subdivided into isocyanines and carbocyanines in accordance with their structural formula. The isocyanines were discovered in 1883 by Spalteholz and independently by Hoogewerff and van Dorp, who found that a purplish red dye could be produced by the action of caustic potash on a mixture of the ethiodides of quinaldine and quinoline. This compound corresponded so closely in composition and in general properties with cyanine blue that it was named diethyl-isocyanine iodide. The recognition in 1903 of the isocyanines as photographic sensitizers brought these dyes again into prominence. They now form an interesting series, which has been fully described by W. H. Mills *et al.* (*Trans. Chem. Soc.*, 1920, pp. 579, 1035, 1550; 1922, p. 579). The dyes are used for the purpose of rendering photographic plates sensitive to a certain part of the spectrum; 'sensitol red,' for example, renders the plate sensitive to the red rays.

The possibility of some of these dyes having antiseptic properties led C. H. Browning and others to investigate them (*B.M.J.*, Apr. 1, 1922, p. 514), the dyes selected being sensitol red, sensitol violet, and sensitol green. To one c.c. of culture medium varying amounts of the dyes were added, along with 0·1 c.c. of a 1 : 1000 dilution in saline of the organisms (*Staphylococcus aureus* or *B. coli*) in peptone water. As test media 0·7 per cent. peptone water and undiluted ox serum were used. The mixtures were placed at 37° C., and were examined after 48 hours for the presence or absence of growth. The following are the conclusions arrived at: (1) Certain of the cyanine dyes are extremely potent antiseptics—for example, sensitol red for staphylococci in watery medium. (2) Selective antiseptic action as between staphylococcus and *B. coli* is exhibited to a higher degree by certain of these dyes—for example, sensitol red—than by any other compound hitherto investigated, the ratios of the sterilizing concentrations probably being greater than 2000 to 1 (with crystal violet the ratio is 500 to 1). (3) Sensitol green is the most active of these dyes both in serum and watery medium for *B. coli*. Also, in the case of *B. coli* the antiseptic action in serum is more intense than in watery medium. Browning and his co-workers promise to report later on the toxicity of these compounds for mammalian tissues and on the action of further members of the series.

Phenyl-ethyl Hydantoin: A New Hypnotic.

A new hypnotic has been announced in phenyl-ethyl hydantoin. It is analogous to phenyl-ethyl barbituric acid, or luminal, barbituric acid being malonyl-urea and hydantoin being glycollyl-urea. The compound itself is not new, phenyl-ethyl hydantoin being described in Watts's *Dictionary of Chemistry* (1894), but its hypnotic properties appear to have been discovered recently in Germany, all the literature dealing with its action having appeared in that country during the last few years. This literature has been collected and studied by E. Gelma and A. Schwartz, of Strasbourg, who have also tested the compound in their own practice, and report their results (*Paris méd.*, Feb. 25, 1922, p. 162).

Phenyl-ethyl hydantoin occurs in white crystals, odourless and tasteless, and only very slightly soluble in water (1 : 1650). In boiling water it dissolves 1 : 110; in alcohol 1 : 20. The sodium salt is very soluble in water, but the solution has an unpleasant, bitter taste, which limits its use to the intravenous and hypodermic methods. In contact with air the solution decomposes rapidly, throwing out the insoluble acid; it should therefore be preserved in ampoules.

In animals a dose of 0·1 gm. of the sodium salt per kilo produced a sleep of 20 hours, while no toxic effects were observed nor was there any caustic action at the site of injection. With luminal a similar dose produced sleep, but gave rise to toxic effects, while veronal-sodium in the same dose had no effect. Even in toxic doses phenyl-ethyl hydantoin does not markedly lower the blood pressure. Pharmacological experiments show conclusively that it is an active hypnotic, very slightly toxic, easy of injection, and without danger of producing local irritation.

Given clinically, in doses of 0·5 to 1·0 gm., or even up to 2 gm., per os, phenyl-ethyl hydantoin has been found to act as an efficient hypnotic, confirming the pharmacological experiments as to its action. Unfortunately certain side-effects have been reported—these are fever and morbilliform or scarlatiniform eruptions, with occasional cyanosis. It is only fair to add that similar effects have followed the use of veronal and other drugs (*see* Orr: PRESCR., Aug. 1921, p. 281), and that Gelma and Schwartz, who have tried the drug in a large number of cases, have never observed any such side-effects. In fact these observers are of opinion, after a fairly extensive trial, that phenyl-ethyl hydantoin is a useful hypnotic, superior to barbitone (veronal), less toxic than either barbitone or luminal, so easily soluble in its sodium combination as to admit of its use hypodermically, free in their experience from unpleasant side-actions, and producing satisfactory sleep in simple and nervous insomnia in doses of from 0·3 to 0·75 gm. in twenty-four hours.

New Drugs and Preparations.

[In the case of items marked * the information is derived mainly from makers' advertisements.]

***Didial** (Ciba) is a combination of diallyl-barbituric acid (dial) and diethylmorphine (diamorphine or heroin). It is given as a sedative before and after anaesthesia as a substitute for morphine.

***Ipecopan** (Sandoz) is described as containing 'the pure active principles of Dover's powder' (by which is meant apparently opium alkaloids and emetine) 'in convenient form and in clinically approved proportion.' In tablets, solution, and malt syrup (Sandoz Chem. Co., Bradford; J. Bell & Croyden, London).

Mercedan is a 25 per cent. solution of mercury-sodium paranucleate, given for syphilis. Ampoules one c.c., or tablets equivalent to 0·01 gm. mercury.—*Merck's Report.*

***Norit** is a medicinal vegetable charcoal containing 85 per cent. pure vegetable charcoal. Given internally for gastric and intestinal affections and applied as a dressing for wounds and ulcers. Issued as powder, dusting powder, and tablets (Boots Pure Drug Co.).

***Perkenol** is described as 'hydrogen peroxide in solid form.' Issued as powder, dentifrice, tablets, etc. (Chas. Zimmermann & Co., London).

Phlogetan is described as a 'sodium derivative,' and is said to have been discovered by Fischer and Wiechowsky, of Prague, and to be given by intramuscular injection for spinal sclerosis.

Laboratory Reports on New Preparations.

MILK OF MAGNESIA: PHOSPHO-MURIATE OF QUININE.

(The Chas. H. Phillips Chemical Company, 14 Henrietta Street, Covent Garden, London, W.C.)

Milk of Magnesia is a suspension in water of magnesium hydroxide, $Mg(OH)_2$; it is a preparation the formula and composition of which are well

PHYLLOSAN.

Remarkable results following experiments by Prof. E. Buergi, M.D.

(Director of the Pharmacological Institute of the University of Berne).

AN ANNOUNCEMENT WHICH HAS BEEN RECEIVED WITH INTEREST AND ENTHUSIASM BY MEDICAL MEN THE WORLD OVER.

A THERAPEUTIC AGENT, DEFINITELY ESTABLISHED, POSSESSING ENDLESS POSSIBILITIES.

THROUGH the researches of Prof. E. Buergi, M.D., who is Director of Studies at the Pharmacological Institute of Berne University, uncertainties concerning the action of the assimilative principle in plant growth, commonly called chlorophyll, have been cleared up. *In brief, Dr Buergi's experiments, demonstrating the close chemical relationship between chlorophyll and human blood pigments, are not without significance.* The decomposition-products respectively of

Chlorophyll	and	Haemoglobin
$\Vert$		$\Vert$
Phylloporphyrin		Haematoporphyrin
$\Vert$		$\Vert$
$(C_{16}H_{18}N_2O)$		$(C_{16}H_{18}N_2O_3)$

exhibit a close similarity of chemical structure, and haemopyrrol ($C_6H_{13}N$) can be prepared by the reduction of either the chlorophyll derivative phyllocyanin or the corresponding haemoglobin derivative haemochromogen. The importance of this relationship will be appreciated, as accounting for the easy transformation of chlorophyll into blood-forming compounds in the human organism. Green vegetables, and especially spinach, long a traditional feature of the diet prescribed in anaemic and run-down conditions, were shown by Buergi to owe their effect to a particular action of chlorophyll, described in an official work published by the Berne University. Until these researches were published, the routine use of spinach, etc., belonged rather to the realm of dietetics than to that of pharmacology. As usually happens where an empirical dietetic treatment is subjected to scientific examination, it was found by Prof. Buergi that the effects obtained from chlorophyll in its natural form were limited by the fact that in order to give a sufficient dose of the active principle involved, the patient would have to be made to swallow quite unmanageable quantities of vegetables, and dispose of all their inert matter as best he might. Hence the good effects now known to have been produced by the chlorophyll in green vegetables could only be relied upon, if at all, where the health of the patient was not seriously impaired. Buergi's discovery showed how *extracted chlorophyll* could be assimilated by even a highly enfeebled organism.

To procure this result, he isolated the active principle, chlorophyll (called by him Phyllosan), in a concentrated form, and clinical experience proved that just as chlorophyll is the assimilating substance of plants, so its active principle Phyllosan gives rise in man also to assimilation and growth of substance. This was shown by its profound and sure influence on the haemoglobin content of the blood, an immediate increase of appetite, with an increase of all vital forces.

BUERGI'S CONCLUSIONS SUMMARISED.

In brief, Buergi's experiments showed that while the usefulness of green vegetables in anaemic and chlorotic conditions was well established, this effect was due solely to the action of the chlorophyll which they contained. Owing to

the quantity of cellulose by which it is enclosed, relatively little chlorophyll could be absorbed. This accounted for the fact that where anaemia and chlorosis were greatly marked, a vegetable diet did little good. The extracted form of chlorophyll, Phyllosan, enabled far greater quantities to be absorbed, and the effects were proportionately more brilliant. They have been confirmed by the clinical experience of his practising colleagues all the world over. Buergi concluded that from many vegetables, as, for instance, beans and cabbage, no chlorophyll, or practically none, was absorbed. Even salads, taken daily over a long period, failed to give appreciable supplies of chlorophyll to the blood. For practical therapeutic purposes, an extracted preparation was necessary: and Phyllosan supplies this.

CLINICAL REPORTS.

To detect an active principle, and then concentrate it into a convenient form, is one thing. To infer that this concentrate will give effective results is quite another, and examples familiar to every reader establish this fact. The satisfactory confirmation of Buergi's expectation that Phyllosan would give definite results was sought in extensive clinical experiments. Favourable reports have already appeared in the leading scientific and medical journals all over the world, including :—

The Lancet. Jan. 7, 14, Feb. 4, 1922.
The Brit. Med. Jour. Mar. 4, 1922.
The Prescriber. Jan., Feb., and Apr. 1922.
The Practitioner. Feb. 1922.
Med. Press and Circ. Mar. 22, 1922.
The Edin. Med. Jour. Feb. 1922.
The Jour. of Med. Soc. Feb. 1921.
Biochemische Zeitschrift. No. 98, 1922.
Therapeutic Monthly. Jan. and Feb. 1918. University of Berne.
Berlin Clinical Weekly. No. 39, 1920. University of Berlin.
Corr.-Blatt. for Swiss Surgeons. Nos. 2, 15, 23, 1916.
Swiss Medical Review. Nos. 29, 21, 22, 23, 1916.
Etc. Etc. Etc.

BLOOD TESTS.

Reports have been received on a series of hospital cases under Phyllosan treatment, blood specimens of which were examined and reported upon independently by the Clinical Research Association, London, each case having previously been treated with iron, malt, cod-liver oil, or other known agents without results. Within one month's treatment under Phyllosan remarkable and definite improvements were obtained, showing a decided haematological improvement in every instance, and the benefit of the patient's general condition—remarkable.

Further reports by Dr Guillerman and Dr H. Driolet show an increase of haemoglobin under iron compared with the increase under Phyllosan to have been as 4 to 8, and the increase in count of red corpuscles to have been as 24,400 to 700,000 in favour of Phyllosan.

ARRANGEMENTS FOR THE SUPPLY OF PHYLLOSAN IN THE BRITISH EMPIRE.

Members of the medical profession are cordially invited to send for samples, literature, and recent clinical research reports, which will be furnished on request, free of charge. Phyllosan can be prescribed in the usual way, and will be dispensed by chemists accordingly, or it may be purchased direct.

It is supplied in tablet form and in bottles containing 60 tablets each.

Communications should be addressed to

CHLOROPHYL AND CHEMICAL CORP. LTD.,
26 Coventry Street, London, W. 1

Telephone—Regent 4363. *Telegrams*—"Filosan, Piccy, London."

known, and there are many such preparations on the market. There is, however, an art in its preparation, and the C. H. Phillips Chemical Company appear to possess that art, for their milk of magnesia has a perfection that is met with in few, if any, of the rival preparations. It presents the features of a perfect emulsion, the magnesia remaining in suspension for a long time, and it is free from carbonate—a desideratum in an antacid for internal use. This preparation has many other uses. It is preferable to lime water as a means of overcoming the acidity of cow's milk for infant feeding ; it forms a useful mouth wash or alkaline skin lotion ; and it may be used to emulsify oils and balsams when these are used as inhalations. It has been recommended as a dressing for the arm in inflammatory conditions accompanying vaccination.

Phospho-muriate of Quinine is an aromatic syrup containing in each fluid drachm : phosphoric acid, 2 minims ; potassium, magnesium, calcium, and iron phosphate, of each 2¼ grains ; quinine hydrochloride, ¼ grain ; strychnine, $\frac{1}{120}$ grain ; with syrup, glycerin, and flavouring agents. The dose is half to one drachm. It may thus be regarded as an improved form of 'Easton's Syrup,' less trying to the digestion, and certainly pleasanter to the palate. It contains no alcohol.

FORMO-GLYCERAL.

(Raimes, Clark & Co., Ltd., Smith's Place, Leith Walk, Edinburgh.)

While the therapeutic value of glycerophosphates has been disputed by physiologists, clinicians are continually prescribing them as a tonic and getting satisfactory results. A combination of glycerophosphates and formates, without sugar or alcohol, is supplied by Messrs Raimes, Clark & Co. under the name of Formo-glyceral, a sample of which we have examined. It is a particularly palatable preparation, and being slightly acid in reaction it is compatible with nux vomica, malt extract, liquor arsenic. hydrochlor., etc. A feature of this preparation is that it contains no strychnine, the physician being recommended to add this by prescribing along with it an appropriate dose of liquor strychninae hydrochloridi.

NUJOL.

(Anglo-American Oil Company, Ltd., Minerva House, Bevis Marks, London, E.C. 3.)

Nujol is a liquid paraffin, specially prepared for internal use. For this purpose it is essential that a liquid paraffin should be pure. The British Pharmacopoeia insists on certain physical characters, such as transparency and freedom from colour, fluorescence, odour, and taste. A sample must also show absence of sulphur compounds. With all these conditions the sample of Nujol submitted fully complies. There is also, however, the important condition of viscosity, and of this the B.P. says nothing. As pointed out in an article in THE PRESCRIBER, Oct 1920, p. 336, the lubricating value of the oil, when used as a remedy for constipation, depends upon its viscosity more than upon its specific gravity, and the proper test to which it should be submitted is one which determines this property. We have examined two separate samples submitted at different times, and find that Nujol gives a high figure of viscosity, which would appear to be constant, as it was the same in both samples. One of the samples was tested clinically with satisfactory results. This product, therefore, can be certified as being suitable for internal use.

KOLYNOS.—As will be seen in our advertisement pages, the address of Kolynos, Ltd., is now Chenies Street, London, W.C. 1.

PRESCRIBING NOTES.

PEDICULOSIS.

In the formula given in our April number (p. 162) for a head lotion containing sodium taurocholate, the quantity of water was incorrectly given as 100. The correct formula is :—

Sodium taurocholate - - - -	10	0
Oil of eucalyptus - - - -	50	0
Water - - - - .	to 1000	0

The impossibility of preparing this lotion with only 100 parts of water is evident.

PHENOL AND LIQUID PARAFFIN.

Boenninghaus (*Deut. med. Woch.*, Dec. 8, 1921, p. 1497) calls attention to the danger of prescribing phenol with liquid paraffin, in which it is not soluble as it is in glycerin. He reports a case in which phenol in liquid paraffin was prescribed as ear drops for a child. The liquid was dropped into the ear from a pipette ; the phenol collected in the mouth of the dropper and was delivered into the child's ear in pure condition, causing considerable damage to the ear. [If this really happened, we can only say that both physician and pharmacist were greatly to blame—the former for prescribing, and the latter for dispensing a prescription so obviously incompatible.—Editor.]

ACETYL-SALICYLIC ACID AND SODIUM CITRATE.

P. N. Leech, of Chicago (*J.A.M.A.*, Jan. 28, 1922, p. 275), refers to a note in these pages (Prescr., June 1921, p. 247) in which the following appeared : 'It is said that sodium citrate will dissolve acetyl-salicylic acid without dissociation : for each grain of aspirin, 4 grains of sodium citrate should be added.' He points out that the usual test for the detection of freed salicylic acid, namely ferric chloride, is liable to misinterpretation, because citric acid and citrates interfere with the sensitiveness of the test. He prepared a solution of the kind suggested and tested the rate of hydrolysis by frequent titrations with normal alkali. He found by this method that hydrolysis began very soon ; after four days the acetyl-salicylic acid had broken down to the extent of 50 per cent. ; after nine days to 75 per cent. ; in seventeen days it was almost completely hydrolysed. Thus, a patient taking such a mixture nine days old would be getting sodium acetate and sodium salicylate in place of acetyl-salicylic acid. [Dr Leech remarks in his article that the paragraph in The Prescriber 'was probably abstracted from some American pharmaceutic publication.' This was evidently suggested by the first words of our sentence : 'It is said that.' We assure Dr Leech that while most of the 'half-baked' information with which we are inundated comes from America, it did not do so in this instance. The statement was made to us on good authority, but being unable at the time personally to verify it we gave it as hearsay. We are grateful to Dr Leech for his communication, but we doubt if titration with normal alkali is a reliable method of estimating the rate of hydrolysis. The presence of citric acid is likely to interfere with the sensitiveness of this reaction, even more than in the case of the ferric chloride test. Acetyl-salicylic acid forms

Introduced into medicine in 1912 as Coagulen (Kocher - Fonio).

NATIONAL SCHEME FOR DISABLED MEN

For internal, hypodermic and intravenous administration.

COAGULEN-CIBA

Represents the coagulating principle extracted from the blood platelets *(Thrombokinase or Cytozym)* possessing most energetic hæmostatic properties.

INDICATIONS: External and Internal Hæmorrhage (Pulmonary, Gastric, Vesical, Uterine), Post-operative Hæmorrhage, Post-partum Hæmorrhage, Epistaxis, Hæmophilia, etc.

COAGULEN-CIBA is a physiological hæmostatic derived from normal blood, and contains the natural coagulating elements necessary for clotting the blood. It is the result of scientific investigation and clinical experiments extending over a considerable period. It is a non-toxic and non-irritating powder to which a certain amount of sugar has been added, with the object of ensuring its prompt solution in water or physiological sodium chloride solution. Coagulen-Ciba may be sterilized by boiling without detriment to its action.

PACKAGES

Coagulen-Ciba Powder in original packages of 2½, 5, & 10 grms.
,, Tablets ,, ,, 5 & 20 tablets.
,, Ampoules (20 c.c.) in original packages of 1 amp.
,, Ampoules (1·5 c.c.) ,, ,, of 5 & 20 amps,

Ciba Brand
PRONOUNCED SEE BAR
REGD TRADE MARK
THE MARK OF
PURITY & RELIABILITY

——*Full descriptive literature to Medical Practitioners*——

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THE CLAYTON ANILINE COMPANY LTD.,
68½ Upper Thames Street, LONDON, E.C. 4.

Rheumatism and Allied Troubles

Preparations Accredited

We recommend "BALMOSA," and we do not think that we can say more than what has been recorded by the *West London Medical Journal*, July :—"An analgesic, antiseptic, snow-like cream, containing Methyl Salicylate with rubefacients in a non-greasy basis. This is an ideal method of obtaining the usual effect of the salicylates in cases of Rheumatism, Neuralgia, muscle and joint pains, etc."

"BALMOSA" supplied in 2 oz. collapsible tubes at 21/- per dozen.

"ACETOSAL" is an equivalent to the original German Aspirin, free from nascent Salicylic Acid and other contaminates ; it is in fact absolute Acetylsalicylic Acid. It is supplied as *Palatinoids Acetosal*, each containing 5 grains. These are jujube cachets in which is contained the drug as powder and without any retarding influence against its solvency and assimilation. Pulverettes are moulded powders coated with chocolate instead of sugar, flat, round, or oval in shape.

Palatinoids are supplied in bottles of 144 at 3/6 each.
—— Pulverettes in bottles of 100 at 2/1 each. ——
Trial samples accordingly supplied upon application.

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179 Queen Victoria Street, LONDON, E.C. 4
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An Ideal Flesh-forming Food

LACTOMALTINE

(MILK, MALT, and CREAM)

LACTOMALTINE is scientific. It contains the richest **Cream** and **Milk,** combined with the finest **Malt Extract.** It is nutritious, palatable, and digestive.

LACTOMALTINE far surpasses Cod Liver Oil in palatability, assimilability, and digestibility, and in its efficiency as a nutrient.

LACTOMALTINE is adaptable to any diet. It may be given in conjunction with farinaceous foods, or taken alone after food or in tea.

In Round, Wide-mouth Jars; Retail, **1/9, 3/-,** *and* **5/6**
—— *Supplied in bulk to Hospitals and Institutions* ——

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HARKNESS, BEAUMONT, & Co.
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soluble salts, and it by no means follows that the patient is taking sodium acetate and sodium salicylate. We are having the matter investigated, for we feel that the last word on the subject has not yet been said.—EDITOR.]

NOTES AND QUERIES.

NOTE.—The Information Department of this journal is at all times freely at the disposal of subscribers. Inquiries should be addressed to the Information Department, THE PRESCRIBER, 6 South Charlotte Street, Edinburgh, and should contain a stamped envelope for reply. Answers are sent direct as early as possible, and the more important replies are summarized from time to time in this page. *We cannot undertake to reply to non-subscribers.*

Potassium Mercuric Iodide (*J.L.*, 4/5/21).—A solution of 'biniodide' approximately 1 : 5000 may be made in several ways : (*a*) mercuric chloride, 1 grain ; potassium iodide, 3 grains ; water, 20 ounces ; (*b*) mercuric iodide, 1·5 grain ; potassium iodide, 1·5 grain ; water, 20 ounces ; (*c*) potassium mercuric iodide ($HgI_2 2KI$), 1·75 grain ; potassium iodide, 1 grain ; water, 20 ounces. In each case there is excess of potassium iodide ; this is necessary to prevent the precipitation of mercuric iodide which takes place in dilute solutions of the complex salt.

Phenol-Iodine in Goitre (*M.G.*, 12/4/21).—Reference to the use of phenol and iodine in goitre appeared in THE PRESCRIBER, Feb. 1921, p. 76, as an abstract of a paper by Sheehan and Newcomb in the *Jour. Amer. Med. Assoc.* The preparation, which was given by injection into the goitre itself, consisted of phenol, tincture of iodine, and glycerin, equal parts.

Pluriglandular Tablets (*D.F.*, 6/2/22).—We are not aware of any preparation on the market bearing this as its trade-name. Many of the advertised products are 'pluriglandular' ; that is, they are made from several glands. Hormotone (Carnrick), Lymphoid Compound (British Organotherapy Co.), and the various Palatinoids (Oppenheimer) are all pluriglandular. The word 'polyglandular,' being a hybrid, should not be used.

Pulse Rate and Meals of Savage Tribes (*C.F.*, 9/1/22).—We cannot find in any of the standard works any reference to the pulse rate of savages as such. The pulse rate is quicker in warm climates, and savages who live in such climates ought, therefore, to have a quicker pulse rate. As regards meals and meal-times of savage races, R. L. Stevenson tells us that the inhabitants of the South Seas have no stated meal-time, eating whenever they feel inclined, much as do the lower animals. Among civilized nations the diet and hours of meals depend of course largely or entirely on climate and other conditions.

'Autobiography of a Stomach' (*W.A.C.*, 19/1/22).—We cannot trace any book published under this name. Messrs Chapman & Hall published a small book, 'Stomach Memoirs,' in 1885 (1s.), and 'Stomach Worship : a Growl by a Vegetarian,' was published by Simpkin Marshall in 1881. Both these books appear to be out of print and cannot be obtained except through a second-hand bookseller or by advertisement in one of the trade journals.

REVIEWS OF BOOKS.

History of the Great War.—*Medical Services: General History*, Vol I. By Major-General Sir W. G. Macpherson, K.C.M.G., C.B., LL.D. Pp. 463. (H.M. Stationery Office. 21s.)

This is the first of a series of twelve volumes, which when completed will cover the entire medical history of the War. The first four volumes will deal with the general history of the medical services; two volumes are to be devoted to the diseases of the war and the medical aspects of aviation and gas warfare; military surgery and military hygiene will each occupy two volumes; pathology and medical research will be the subject of one, and medical statistics and epidemiology that of another. Of the four volumes dealing with the medical services, the present volume treats of work in the United Kingdom and in garrisons overseas, with an account of that in the German colonies and in Tsingtau; the others are to describe the services in France, Italy, the Mediterranean theatres of war, Mesopotamia, Aden, East Africa, and Russia. The Editor-in-Chief, Major-General Sir W. G. Macpherson, has certainly aimed at completeness: he has set himself a heavy task, and, so far as the result is apparent in the present volume, he is to be cordially congratulated. The material for the volume before us has been obtained from War Office files, reports of parliamentary and other committees, reports from the administrative medical services of commands, from consulting surgeons, physicians, and other specialists, from the different branches of the medical department in the War Office, and from other sources; and when one reads the book and observes how faithfully and yet how succinctly all this is presented, one cannot speak too highly of the ability of the editor. There is no verbosity; even the parliamentary reports are infused with life; tables and statistics there are, but there is a complete absence of lengthy quotations or of verbatim correspondence—in short there is nothing that one feels inclined to 'skip.' There are one or two faults, but these will be referred to later.

The experience of the South African War and the lessons from the Russo-Japanese War led to a complete reorganization of our military medical services: this was fortunate, for it made it possible to deal efficiently with our sick and wounded practically from the very outset of the war. The opening chapters describe in an interesting manner how this reorganization was accomplished; how the medical services were mobilized and administered; how the hospitals were arranged, and how the sick and wounded were received and distributed. The disposal of the sick and wounded furnishes a telling chapter, and there is little doubt that this was one of the greatest achievements of organization in the War. The medical examination of recruits, described in another chapter, was not so great a success: we know to our cost that many mistakes were made, both by military and by civil doctors. These errors, however, proved valuable lessons, and the examination of practically the entire young male population elicited facts which later led Government to deal with the problems of public health.

Other subjects dealt with are: supply of stores, sanitary organization, voluntary aid, demobilization, and the services in the various stations abroad. Statistics are given in the appendices, and there is a good index.

Limitations of space prevent our dealing in detail with many points in the present volume, but one general impression may be recorded. Interesting—

indeed fascinating—as it all is, it is just a little *too* perfect. Everything seems to have gone like clockwork, and the name and rank of everybody who did anything is carefully set down. We hear nothing of failures, except when they are to be explained away or when the blame is to be put on someone else's shoulders. We all learn from experience, but only when we admit our errors ; and five years of military medical work covering the whole Eastern Hemisphere cannot have been free from mistakes, which ought to have been recorded.

The book is well printed and illustrated, but it ought not to be issued with leaves uncut, and the contents are worthy of a more dignified binding.

King.—*Studies in Influenza and its Pulmonary Complications.* By D. Barty King, O.B.E., M.A., M.D. (Edin.), etc. Pp. 88. (Churchill. 7s. 6d.)

This volume deals with the pulmonary complications of influenza. During the war Dr King met with a special type of case with acute broncho-pneumonia, epistaxis, and severe frontal headache, which nearly always proved fatal. In malarial influenza he also came across a similar type, but always without the epistaxis. He also considers very fully the after-effects of the acute pulmonary complications of influenza as revealed by clinical, radioscopic, and post-mortem examinations. He rightly urges the importance of carefully examining the chest after the temperature has fallen in cases of pneumonia in order to prevent the onset of chronic lung mischief. For this purpose radioscopic examination is of great value. The neglect of such investigations undoubtedly accounts for the majority of these cases of chronic pulmonary diseases, such as chronic pneumonia and bronchiectasis. In his concluding essay Dr King considers the epidemic of 1918-19 as it affected the nursing staff of the County of London War Hospital. These studies are most interesting, and we recommend their perusal to our readers especially in view of the fact that influenza epidemics have been specially prevalent of late.

Tidy.—*A Synopsis of Medicine.* By Henry Letheby Tidy, M.D. Second Edition Revised. Pp. 956. (Wright & Sons. 21s.)

It is barely eighteen months since we reviewed the first edition of this book, and the fact that a second edition has already been called for shows that it fills a want. In the meantime the book has been on our desk and has been subject to frequent reference ; in every case it has given just the information wanted. Its general arrangement follows that of Osler and McCrae's Medicine, but the information is given in the form of a condensed summary (something like the February number of The Prescriber) which is very convenient for reference. In this edition the chapter on Encephalitis Lethargica has been completely rewritten in the light of recent researches. We cordially commend this book.

Turner.—*Ringworm.* By John P. Turner, M.D. Pp. 62. (F. A. Davis, Philadelphia. $1.00.)

This is a small volume on a very practical subject. The history, pathology, diagnosis, and treatment of ringworm are clearly discussed. The author points out that ringworm of the scalp often exists unknown to the parents. The treatment advised is not the x-rays, but a series of applications of different antiseptic ointments. There is nothing actually new in the book, unless it be the chapter on treatment ; but, nevertheless, as a short and practical account of a common disease it possesses a definite value for the practitioner.

MAGIAN.—*The Practitioner's Manual of Gynaecology.* By A. C. Magian, M.D. Pp. 436. (Wm. Heinemann. 21s.)

This book is written for the general practitioner, and its object is to present a readable synopsis of the chief diseases peculiar to women. There are chapters dealing with anatomy and physiology and with the methods of examination. Then follow chapters on menstruation and its various disorders, abnormal haemorrhage from the genital organs, venereal and tuberculous pelvic disease, together with chapters on the other diseases of the female organs of generation. Attention has also been given to operative technique and to the various operative procedures in gynaecological practice. A useful account is given of the care of the patient after operation as well as of the after-results of abdominal and vaginal operations. The section on diagnosis is very helpful, while the two concluding chapters on sterility and abortion are clearly written. The volume contains nearly 150 illustrations, and is altogether a most satisfactory production. It is extremely well adapted to the needs of the general practitioner, and will serve him as a thoroughly reliable guide to the diagnosis and treatment of the diseases of his women patients. It is a book which we can thoroughly recommend as a help in everyday practice.

COLWELL.—*An Essay on the History of Electrotherapy and Diagnosis.* By Hector A. Colwell, M.B., L.R.C.P., M.R.C.S., D.P.H., Assistant Radiologist, King's College Hospital. Pp. 180. (Heinemann. 17s. 6d.)

Few branches of science have had so rapid a development and so eventful a history as electricity, and the application of electricity to medicine furnishes a story full of interest and fascination. Mr Colwell's essay takes us back to the earliest records of electrotherapy, when Anthero, a freedman of the Emperor Tiberias, was cured of gout by stepping on a live torpedo-fish on the sea-shore. The lodestone appears next as a therapeutic agent, but the first beginnings of the modern science of electricity appear to be due to William Gilbert (1540-1603), physician to Queen Elizabeth. Then electric machines made their appearance, and passed through various stages of development down to those of the present day. Now electricity renders service in diagnosis, and we have the x-rays, electrical illumination of cavities, the electro-cardiagraph, etc. All this is described by the author in a manner that makes a most readable story. A feature of the book is its illustrations, which the author has collected from many sources, and which the publishers have in some cases reproduced very effectively.

SCHAFER.—*Experimental Physiology.* By Sir Edward Sharpey-Schafer, F.R.S., Professor of Physiology in Edinburgh. Third Edition. Pp. 131. (Longmans, Green, & Co. 6s.)

This book describes some common experiments which every student of physiology is, in these days, expected to know how to perform. Whether these will make the medical student a better practitioner of the healing art is, we think, open to question. Too great a reliance on physiological experiments is tending to hinder the progress of medical science, and much of the time spent by the student at this work might with advantage be devoted to practical clinical study. Under present conditions, however, such a book is necessary, and the one before us is most explicit and reliable as to details. It covers the ground-work of experimental physiology very thoroughly, and in this edition many of the descriptions have been rendered clearer and more precise than in former issues.

LITERARY NOTES.

The Technique of Psycho-Analysis is the title of a small book of 133 pages, by David Forsyth, M.D., late President of the Psycho-Neurological Society (Kegan Paul : 5s.). It is written for the medical profession, and takes for granted a certain acquaintance with the subject on the part of the reader. That being so, we think the work is unnecessarily elementary : a man of Dr Forsyth's experience and gifts could easily have conveyed much more information of use to those contemplating the practice of psycho-analysis. No one, armed only with this book, can hope to become even a beginner. The volume, however, will stimulate interest ; the author's views are sound and moderate, and its appearance is distinctly refreshing after the torrent of slip-slop that has been finding its way from America to these long-suffering shores.

It seems almost sacrilege to expose the weaknesses in the character of a great man, which is what Professor Freud does in his book on Leonardo da Vinci, as translated by A. A. Brill (Kegan Paul : 12s. 6d.). It is an attempt on the part of the author to show, by the application of psycho-analysis to various known facts, how the artist's sexual peculiarities are reflected in his work. It may be science, but this conflict of hard science with sacred art is, to say the least, unpleasant. Although this edition is about half the price of that published in America, the price asked is high for 130 small pages. It is reproduced by a newly invented process, which will require considerable development before it can replace good printing.

We have received a copy of the sixth edition of A Compendium of the Pharmacopoeias and Formularies, by C. J. S. Thompson, M.B.E. (Bale, Sons & Danielsson : 10s.). A comparison of this volume with the fifth edition, issued in 1915, shows an addendum of 24 pages at the end of the book, containing an epitome of the Dangerous Drugs Act and Regulations, a description of a few newer antiseptics, etc., and some additional formulae. Otherwise (with the exception of the title-page) the book appears to be identical with the fifth edition. The synopsis of the U.S.P., for example, applies to the 1905 issue, instead of that of 1916. This is a pity, for there is room for a book of this sort only if it is kept to date, and much has happened in seven years. We have watched with interest the development of this little book through its various editions, and we predicted a useful career for it. We are therefore not a little disappointed, and we hope that before long its talented author will bring out a seventh and completely revised edition.

The Medical Annual, 1922, has again appeared with promptness (Wright & Sons : 20s.). This is the fortieth volume, and we observe with satisfaction certain improvements in the arrangement of the contents. The entire text is now in one part ; the short portion hitherto appearing at the beginning under the title of 'Materia Medica and Therapeutics,' which was seldom very complete, is now incorporated with the body of the work, while the Editor summarizes the contents in an introductory chapter. The usual miscellaneous information is given at the end of the book, and the whole work maintains its high standard of usefulness and completeness.

The issue of the Medical Press and Circular dated April 5th is devoted entirely to the subject of cancer. Ten original articles, all by well-known specialists, make up the bulk of the number, while six pages are devoted to abstracts from foreign journals on the same subject. This issue, which is a double number, price 1s., is a valuable contribution to the literature on this important disease.

The Labour Movement and the Hospital Crisis is the title of a pamphlet issued by the Trades Union Congress and the Labour Party (32 Eccleston Square, London, S.W. 1) at one shilling. It contains a full review of the situation from the Labour point of view, and sums up its proposals in thirteen concrete suggestions. They would have all hospitals under central control, with treatment centres in out-lying districts, local hospitals in the smaller towns, county hospitals to serve suitable areas, and national teaching hospitals in London and Edinburgh and other university towns. They advocate organized co-operation between these various centres, and would give voluntary hospitals the option of being taken over by the health authorities. The case is well stated, and while we do not think it entirely solves the problem, it is a useful contribution to discussion.

We have received from Messrs H. C. Baildon & Son, Pharmacists, Edinburgh, a booklet issued on the occasion of the centenary of that firm. The book contains a history of the firm since its foundation in 1821 ; it is neatly produced and contains some very interesting illustrations in addition to very readable text-matter. The firm issues the book gratis.

From Boots Pure Drug Co. Ltd., Nottingham, come several interesting pamphlets. These are : British Made Chemicals, a list of some of the most recent chemicals used in medicine and the arts ; Flavine Antiseptics, a summary of the properties and uses of the acridine dyes ; Therapeutics of the Times, No. 1, a pamphlet dealing with chloramine-T and several similar antiseptics ; and The Uses of Saccharin in Dietetics. These are issued gratis.

BY THE WAY.

Chemical Cantos.

Sam put $AgNO_3$
In his ma's perfumery,
Thinking he would make a hit
If he strengthened it a bit.
Now each morning little Sammy
Goes to greet his Coal Black Mammy !

Johnny, feeling life a bore,
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PRE-HIPPOKRATIC MEDICINE.

BY

JOHN D. COMRIE, M. A., B.Sc.,
M. B., F. R. C. P. Edin., F. S. A.,
Lecturer on History of Medicine,
University of Edinburgh.

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PRE-HIPPOKRATIC MEDICINE.

By JOHN D. COMRIE, M. A., B.Sc., M. B., F. R. C. P. Edin., F. S. A.,
Lecturer on History of Medicine, University of Edinburgh.

It seems strange at first sight to read that Hippokrates, the father of medicine, should in the fifth century B. C. have written a treatise "Upon Ancient Medicine," but when one reflects upon the high degree of skill that the acute intellects in the age of Perikles had developed from tradition and obsrvation, it is not surprising that they should turn back with curiosity to investigate the cruder beliefs of a former and less enlightened time. Hippokrates, reared in an Asklepiad family, amid medical traditions, and tracing his genealogy back through fifteen supposed ancestors directly to Asklepios, thought that medicine as a science had originated through experience of substances found useful for the health, much in the same way as dietetics had developed.[1] Those classic writers who treated of the history of medicine took a similar rational view of its origin, and Celsus at the beginning of the Christian era speaks of Aesculapius, who, because he cultivated with a little more skill the science of medicine which before his time had been rude and common to all men, was received into the number of the gods. Also he speaks of the early philosophers skilled in medicine, of whom the most notable were Pythagoras, Empedokles, and Demokritus. The last of these was the teacher of Hippokrates of Kos, the first memorable man who separated the study of medicine from that of philosophy.[2]

But modern research takes us back to and supplies us with definite information regarding the medicine of a period as far removed from that of Celsus as he is from our own time.

Medicine begins with primitive man in much the same fashion, no matter whether he is the Accadian of four thousand years ago, the Red Indian of a few generations back, or the simple South Sea Islander of to-day. In his earliest development the medicine man is the magician as well as the healer. He controls the elements, placates offended deities, and heals disorders of the body.

If we go back to the first records of those people in the valleys of the Nile and the Euphrates to whom we owe the beginnings of our civilization, we find that medicine had already, under their earliest kings, developed beyond this primitive stage and had become a distinct and a respected calling. In Egypt the names of at least two of these early physicians have come down to us. Nenekhsekhmet was chief physician to one of the kings in the Fifth Dynasty (2,700 B. C.) and his tomb at Sakharah records his high standing at the court and the gratitude of his royal master.[3] Even at this early period some elementary knowledge of the structure of the body and course of the blood-vessels was taught, as we find from a reference in the Ebers papyrus, while the surgery of Nenekhsekhmet's time had advanced to a considerable degree of skill.[4] In a sand grave of this period a body has been found of which the femur, broken by an accident that caused the patient's death, is still surrounded by the splints with which a surgeon of the time has sought to remedy the displacement and promote the healing of the fragments. These splints extend from about the groin to well below the knee, are protected by linen pads, and fastened by linen bands, so that had the patient lived a useful, albeit shortened limb would most probably have resulted.[5] These early practitioners were well aware of the necessity that a broken limb should be kept at rest, supported by splints, though they had not yet devised any means of combating the great tendency to shortening. Accordingly we find that in a land teeming with people busy in the arts of building and of commerce and active in warfare, graves containing remains with fractures that have healed are by no means uncommon. Although in the graves of prehistoric Egyptians the bones have united in all manner of distorted positions, when we come to those of the Fifth Dynasty and onwards, we find that the practitioners who rendered aid to the injured had sufficient skill in applying splints to prevent any gross distortion after union.[6]

A more shadowy, though older, representative of the healing art than Nenekhsekhmet is found in the god I-em-hotep who, in all probability the apotheosis of some famous physician of an early dynasty, had become the fashionable and popular object of worship at Memphis long before the days when Israel sojourned in the land of Egypt. When at a later date the Greeks were admitted into Egypt, they identified him with their Asklepios.[7]

Separated from Egypt by what in those early days was a stretch of desert almost impassable to invading armies, lay the great civilization of the Chaldean and Assyrian states in the Euphrates valley. The latest research among the cuneiform tablets unearthed from the remains of cities in this region, sacked, buried and all but forgotten for many ages, has discovered a civilization which in its social and commercial institutions was most highly organized. Two thousand years B. C. in the time of King Hammurabi of Babylon, we find a society in which equitable laws relating to marriage, slavery, commercial transactions and buying of land were enacted and administered. Even the medical profession was protected and, if need be, punished by the laws. From the code of this king we learn that surgical treatment of wounds, cataract, broken limbs, and the bowel was carried out, the remuneration varying from ten to two shekels according to the circumstances of the patients (that is roughly from $5 to $1). If, however, the patient's life or eye was lost through malpractice, the doctor's hands were to be struck off.[8] This last regulation, seemingly hard upon what might be a pure misfortune, was probably intended to be carried out only as a protection against quacks, and it may be compared to a modern occurrence related to the writer by a friend in the Medical Service of the British Colonial Government. A negro with an old standing inguinal hernia met two other natives in the forest of Nigeria who professed to be able to cure the trouble at once. This they did by laying him on his back, plunging a knife into the swelling and collecting their fee, after which they decamped. Suffering from peritonitis, the unfortunate patient was carried for two days' journey to the nearest hospital, which he reached in a dying state. The arm of the law, however, found the bogus surgeons, who received two years' imprisonment for their quackery. Four thousand years ago this malpractice would have been effectually stopped by the simple and exemplary method of cutting off the hands.

With regard to the character and usefulness of native Assyrian medicine, we must remember that it was practised among religious and intelligent peoples of whom it has been said that a "right thinking citizen of a modern city would probably feel more at home in ancient Babylon than in mediæval Europe."[9] The average Babylonian was a just and simple man, living under equitable laws and carefully framed commercial contracts. His skill as an architect, engineer and artist was considerable, and for his success in military operations, his care in matters of trade, and his studious observation of natural facts, he commands our admiration as a warrior, a merchant, and even as a moderate scientist. That medicine was a calling of importance among such people shows therefore that it must have been of use, and in accordance with its eminently theurgic and mystical nature we must conclude, that among Semitic races of exalted imaginative temperament the employment of mental modes of healing was perhaps found even more beneficial than the administration of the natural and generally simple substances in which their physicians dealt.

When we come down to a period five hundred years after King Hammurabi's time, we find that the centre of political power in the antique world had shifted to the land of Egypt, which, under the Pharoahs of the New Empire, ruled the lands and exacted tribute of the peoples from the Euphrates to the Libyan desert. To this time belongs the Ebers papyrus, the oldest book upon medicine.[10] In its 107 pages of hieratic writing, we find several of our modern drugs, like cedar-wood-oil, turpentine, opium, squills, myrrh, yeast, blue-stone, lime, soda, nitre, but many of the remedies cannot be translated because their names are not found in any other writing. Not only were medicines thus administered internally by the Egyptian physician of 1500 B. C., but ointments, plasters, suppositories, inhalations, enemata, the cautery, and the knife were methods by which disease was externally attacked. Tumors were removed and abscesses opened by finely moulded bronze knives like three which the present writer has figured in a recent paper.[11] Many of the prescriptions, however, it should be stated are fatuous and contain disgusting remedies such as the parts and excrement of various clean and unclean animals. Charms, too, were of great importance, and the Egyptian who carried on his person the Utchat or amulet of the Eye of Horus was likely to be safe and happy; while before the drinking of medicines it was necessary to invoke with appropriate ritual the help of Ra, Isis, Horus, or Osiris as the case might be. As a type of the men who used these books and instruments, we have in the Ethnographical Museum of Leyden a statue of Auta, a physician of 1500 B. C. This statue which, like other carvings of the time, we may assume to be a faithful delineation of the deceased, presents a sturdy, round-faced, pleasant-looking little man with shaven head, seated clothed in a pleated linen robe and wearing sandals on his feet. With regard to the diseases from which the ancient Egyptians of this period suffered, the mummies, whose internal organs have been removed, give us, of course, little help,

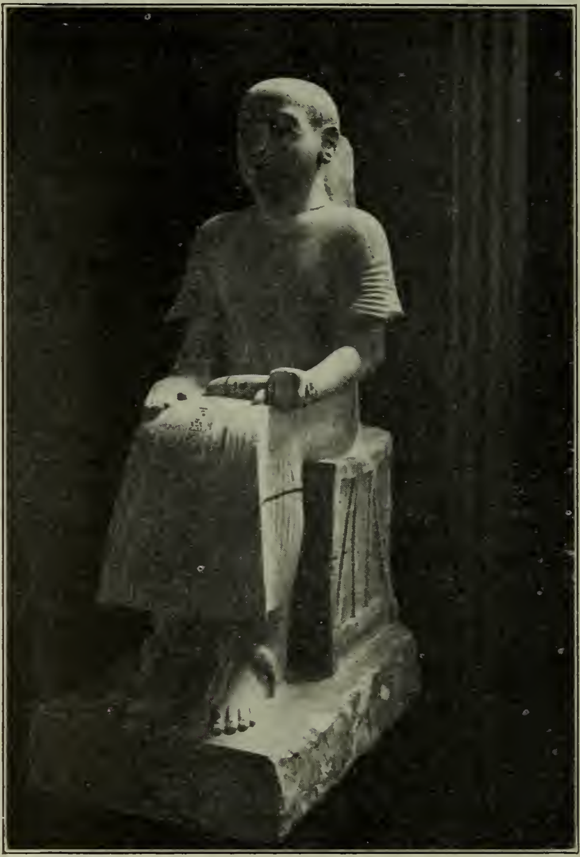

Fig. 1. Statue of Auta, a physician of 1500 B. C.
(From the Ethnographical Museum, Leyden.)

but we gain much information from bodies which have been found buried in the sand with the soft parts shrivelled but preserved to a wonderful extent.[12] Thus we know that rheumatoid affections were particularly prevalent in Egypt then as they are to-day; that atheroma might affect the blood-vessels; small-boned limbs have been found as if from the effects of infantile paralysis; and bones showing ulceration, apparently from the erosion of malignant tumors; also several skeletons have been found showing destruction of vertebræ and spinal curvature, the result probably of tuberculosis.[13] Modern methods of softening the tissues of mummies have made it possible to demonstrate by histological means that the Egyptians of 3,400 years ago suffered from the same diseases of blood-vessels and kidneys which the descendants of these people show at the present day.

When one tries to form a judgment of 18th dynasty Egyptian medical practice (1500 B. C.), one reflects that it existed for a people who passed a primitive but glorious life in the sunshine of the long valley watered by the bounteous Nile. They reaped the heavy crops that sprang from the river's superfluity; their workmen and sculptors toiled to raise stately temples and to hew colossal statues that bade fair to make their generation as famous as the ancestors who centuries before had built the pyramids; their artists possessed a power of delineation so simple and so telling that it bears forever the stamp of genius; their priests copied and composed writings which contained the sum of human knowledge to their time, and a singular mystic lore supposed to give its possessor wondrous power over the brute forces of outside nature; their craftsmen wrought all sorts of beautiful implements and arms in hardened copper, and fashioned jewels of gold, silver and precious stones for the wealthy nobles who lived in rich villas by the Nile and hunted in its marshes. Amid these surroundings it cannot be doubted that the physician using the means we have described attained to a high degree of skill as he certainly occupied a high place alike in royal and in popular esteem. While it is true that the precise methods of our present scientific medicine were unknown to him, he possessed in all likelihood powers of observation and generalization which would go far to counterbalance the defect. Like the Assyrian doctor, too, he possessed an important ally in the mysticism and reliance upon supernatural agency which formed so large a part of his patients' creed. Every disease was a kind of possession of the body by demons or other baneful agency to be removed partly by prayer and exorcism as well as by drugs and other corporeal applications.[14]

After this period of Egypt's greatest glory, we find the dwellers in Greece and the people of Assyria gradually rising into power and prominence. A people of Asiatic origin flourished and declined at Mycenae, in Crete, and in the Aegean Isles, upon whose luxury the later poets longingly looked back as the age of gold. But we know nothing of their medicine save that they could build healthy dwellings with well-constructed drains. Later among the Homeric Greeks of 1000 B. C. the healer was held in high repute. There is a passage in the Odyssey from which we gather that the professional classes were those of the soothsayer, the bard, the physician, and the builder of ships, and in which we are told that these men, even when strangers, are welcomed at any banquet over all the wide earth.[15] In the Odyssey the connection of Greece with Egypt is indicated by a passage that speaks of Helen as having learned the uses of many healing and baneful drugs from Polydamna, a woman of Egypt, "where each man is a skilled physician."[16] Though the Homeric healer was no less a warrior because of his beneficent calling, he was more valued for his healing powers, and we read that "a physician is worth many other men to cut out arrows and to spread soothing drugs." No doubt the greater part of the Homeric medicine consisted simply in the extraction of missiles and the application of drugs to remove the pain of wounds.[17]

If we turn again to Assyria in the 7th century B. C. we find medicine not very highly developed, it is true, but its practitioners flourishing from a social standpoint and much sought after. Out of the library of Assurbani-pal, inscribed in cuneiform characters upon baked clay tablets, which had remained in the ruins of Nineveh from its sack in 606 B. C. till they were discovered and brought to the British Museum in the 19th century, nearly five per cent. were medical works.[18] In these, so far as they have been yet deciphered, we find substances like oils of sesame, olive and castor, syrup of dates, honey, salt, and numerous other drugs of which the names cannot be translated; but there is a great amount of ritual, and apparently the mode in which remedies were administered counted for as much as the remedies themselves.[19] Numerous metrical prayers for recovery from sickness have also come to light.[20] The profession of magician was an important one in Babylonia and Assyria at this time, and was indirectly connected with that of medicine. For ages the Babylonian astrologers had been observing and recording facts, and it was natural to suppose that if certain facts, such as peculiar positions of the planets in the heavens, had in the past been followed by exceptional terrestrial occurrences, the same state of matters occurring again in the heavens would be followed in future by similar occurrences upon the earth. This assumption, it is true, forms the basis of all science, but the Babylonian made the essential mistake of grouping together in a causal relation facts which had no connection with one another. We find that the Babylonian state magicians submitted to the King monthly reports for his guidance. In such matters as the prediction of weather conditions, they may have given useful information, but on serious political prophecies such as the result of war with a neighboring kingdom they often saved their reputation by giving an alternative prediction such as the possibility of a bad harvest. From one of these monthly reports we learn that the professions of physician and magician had already become distinct, for we find one of the latter craving medical assistance,—"Bilipus, the Babylonian magician, is very ill; let the King command that a physician come and see him."[21]

The higher physicians were important men about the Assyrian court, and letters from one of them, by name Aradnana, to his royal master, Esar-haddon, have come down to us. In one of these he speaks of curing an inflamed condition of the Prince's eyes, in another of stopping bleeding from the nose, in still another he directs the King to anoint himself as a protection against draughts, to drink pure water, and to wash his hands frequently.[22] From temple records we also know that the Babylonian temples had doctors attached to them among their other officers.[23]

Another practice in which medicine, or at all events pathology, came into contact with the realm of magic was in the art of divination by inspection of the liver in sacrificial animals. There was a wide-spread idea in the ancient world that the examination of the liver and the position of flakes and thickenings upon its surface helped to foretell events of the future. The liver indeed seems by the Semitic peoples to have been regarded as the chief organ of the body and dwelling of the soul. Not only has a Babylonian clay liver been found carefully mapped out in squares which indicated the prophetic importance of each part in foretelling political events or prognosticating recovery from sickness,[24] but a similar object made of bronze has been found in Italy as a relic of the ancient Etruscan soothsayers, plotted out in areas upon which are inscribed the names of various gods. Doubtless these objects were used as a kind of hand-book in divination by the persons whose business it was to read

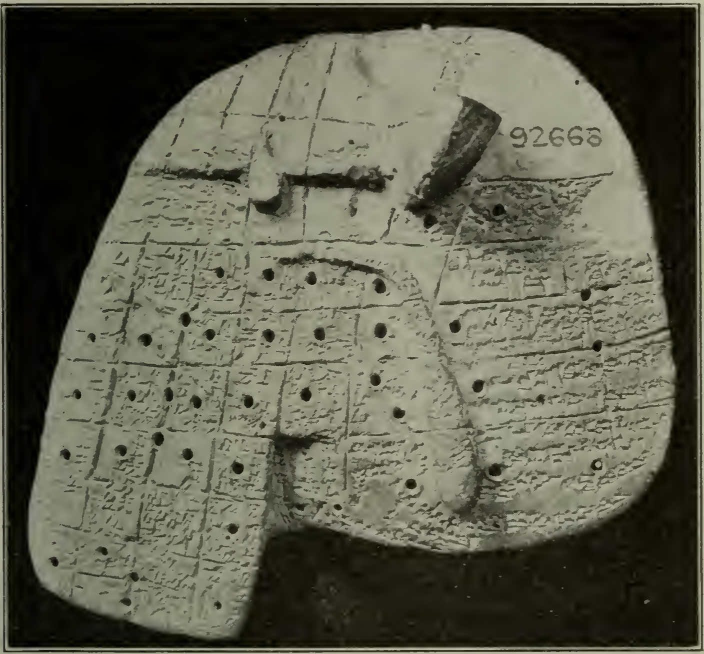

Fig. 2. Babylonian Clay Liver used for divination. (From the British Museum. Photo by Mansell.)

the signs that told events about to happen.[25] Plato even in the 4th century B. C., defends the idea, which appears to have been generally accepted in his time, and explains how the liver may come to be a mirror of passing events.[26]

* * * * * * * * * * * * *

Following upon the sack of Nineveh by the Medes and Persians in 606 B. C., the Assyrian organization, including its medicine, passed away; but the physicians from Greece and Egypt maintained an influence so powerful at the Persian court that they directed in some instances the foreign policy of their adopted country. Cyrus the Great (about 530 B. C.) welcomed all physicians to his court, and their medical stores formed, as Xenophon tells us, an important adjunct to the equipment of his military expeditions.[27] Cambyses was so much under the domination of an Egyptian physician that the latter, to gratify a private grudge against Amasis, king of that country, was able to induce the Persian to conduct an expedition to the conquest of his former land.[28] A similar result was almost brought about with regard to Greece and its colonies in Italy by the ruse of a Greek physician, Demokedes, who obtained great influence over Darius, King of Persia, and his consort, by having cured both of serious affections, but who yet longed to return to his Grecian home. The history of this Demokedes, related at length by Herodotus, gives a vivid picture of his times (500 B. C.), and incidentally we learn from it that public medical officers were then employed by the various Greek towns at the yearly salaries of:

Ægina, 60 minae ($1,170).
Athens, 100 minae ($1,950).
Samos, 120 minae ($2,340).[29]

Demokedes offers a point for comparison between Egyptian medicine and that of Greece, for so disgusted was the Persian king with the clumsy treatment meted out by Egyptian physicians to his injured foot compared with that undertaken later by the Greek that he was about to put the Egyptians to death had Demokedes not craved their lives as a royal boon. A still more important connecting link was formed by an earlier countryman of Demokedes, the philosopher Pythagoras, who lived sometime before 500 B. C. and who was closely identified with Samos and Kroton, a Greek colony in Italy. It is commonly accepted that Pythagoras had resided for some years in Egypt, and that from the mystic rites of this country he had developed many of his curious religious tenets. According to one tradition, he brought back with him to Greece that remedy which still figures in pharmacopœias and is known as oxymel of squills. Milo, the father-in-law of Demokedes, was one of his immediate disciples. Pythagoras taught the kinship of beasts and men, and as a corollary the necessity to abstain from animal diet, and the transmigration of the soul. It is interesting, too, from a medical point of view to note that both Pythagoras and Empedokles in the strongest terms forbade their followers to partake of beans, apparently in some way recognizing the very close similarity that exists in the composition of these legumes and of animal flesh. The story is even related that Pythagoras, pursued by his enemies, suffered death rather than trample through a field of beans which lay upon his line of flight.[30]

Doubtless this intercourse of Greeks in Ionia and in Italy with the people of Persia and of Egypt effected, even at this early date, the introduction of many practices and ideas into the philosophic medicine of Greece. Nor must we forget the influence of the Phoenician traders in diffusing the practices of Semitic medicine around the Eastern Mediterranean shores.

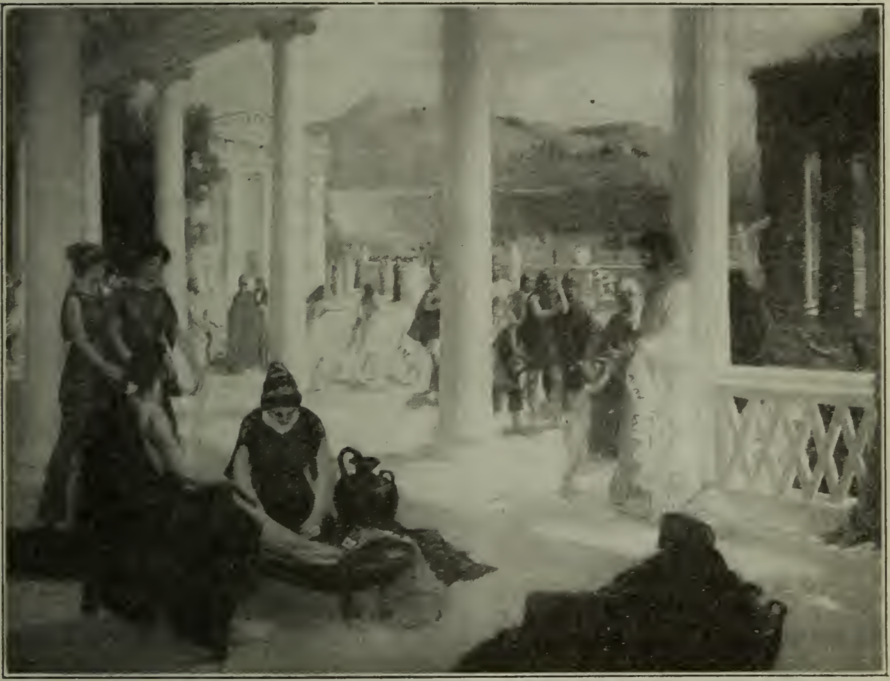

Fig. 3. Health Temple at Epidaurus in the 4th Century B. C.
(From a painting by Mr. W. M. Glass in the writer's possession.)

Greek medicine in the Hippokratic sense was, however, a plant of purely native growth and owed little, save the knowledge of certain drugs, to any countries of the east or south. It is necessary to recognize three separate and quite distinct forms of Greek medical development. Firstly, there were the early philosophers whose speculations brought them closely into touch with the healing art; while perhaps they did not as a rule attempt the cure of sick persons, yet a thorough knowledge of the art formed an important part of their philosophical equipment. Secondly, there were the temples of Asklepios which had existed as sanctuaries of theurgic healing from prehistoric antiquity. Thirdly and closely connected with the last, were the Asklepiad schools or guilds of physicians proper, the chief of which were situated at Knidos, Kos and Kroton. These began to develop in importance as distinct from the profession of philosophy only a little time before the period of Hippokrates.

Firstly, with regard to the philosophers, one of the earliest was Thales, founder of the philosophic School at Miletos. The date of his birth is usually given as about 625 B. C., and he was in his prime about the year 585. He is chiefly of interest, so far as our present purpose is concerned, because he forms an example of the early connection that existed between Greek philosophy on the one hand and the thought of Egypt and the East upon the other; for he appears to have been of Semitic origin and had been to Egypt in his earlier years.[31] Medicine is more concerned with his disciples or associates, Anaximander and Anaximenes. Anaximander, who was some forty years older than Pythagoras, was the first to suggest that living creatures arose from the moist element and the human being from fish-like ancestors.[32] His speculations, confirmed by the precise methods of our own day, were apparently the result of examining the embryos of men and fishes. Anaximenes, his younger associate, propounded the view that air was the infinite substance and formed the soul of men,—a theory which, together with the teaching of Empedokles, regarding respiration, had a most important influence in moulding the Hippokratic doctrines.[33]

Pythagoras, as we know, settled in his prime at Kroton, and his dwelling here may have had an important influence upon the medical school already established in that place. No doubt, however, most of the legends told of him by his later followers are without serious foundation, and whatever may be the debt owed to him by philosophy, in the healing art his merits are sufficiently covered by the title of "medicine man."

Alkmaion of Kroton, a pupil of Pythagoras, was a more distinguished figure in the history of medicine. In the first place he originated the view that the brain is the common sensorium, an idea at which he arrived probably from making dissections of the body. This being the case it is likely that we owe to him the first discovery of the cranial nerves. Their proper function to convey sensory impressions was not, however, generally recognized for another couple of centuries, since Hippokrates still regarded the blood as a means of sensory communication, while even Aristotle (circa 350 B. C.) confused the channels afforded by these nerves with arteries going to the brain.[34] Alkmaion also advanced theories as to the working of the various organs of the senses, and here again he was a pioneer, attributing the act of vision partly to something reflected on the eye from the outer world and not simply regarding it as produced within the eye itself. With regard to disease, he was one of the first to treat health as a state of "isonomy" in which outside things like moist and dry, cold and heat, were evenly balanced. Disease was, on this theory, the "monarchy" of any one of these, a kind of "injustice" in the microcosm of the body.[35]

Philolaos, another Pythagorean and an older contemporary of Hippokrates, wrote also upon medicine. He held that the body was built up only of warm things to which the cold was added by way of respiration. He made blood, bile and phlegm to be the causes of disease, a further and more definite step than had been taken before his time in the establishment of that humoral pathology which, elaborated in the Hippokratic writings, survived him by over two thousand years.[36]

Empedokles of Akragas flourished about the time Hippokrates was born and was a great democratic leader in his native city as well as a philosopher. The former aspect of his activity is proved by a tradition that on one occasion, having been at a dinner party where the host and a public official of the city had arbitrarily commanded the company to drink the wine provided or have it poured upon their heads, he next day brought these two persons before the city council and had them condemned and put to death as tyrants. In addition to being a statesman and philosopher, he was, like Pythagoras, a "medicine man." Galen makes him out to have been the founder of the Italian school of medicine which he puts upon the same level as those of Kos and Knidos.[37] Certainly he had great repute as a healer in his day, for a case is recorded in which he brought back life to a woman who had been breathless and pulseless for thirty days (a case apparently of hysterical suffocation).[38] He sweetened the pestilential marshes between Selinus and the sea by diverting the rivers Hypsas and Selinus into them and thus freed the city from malaria.[39] He held that the four elements were to be identified with the heat, cold, moist and dry—another contribution to the doctrine of the humours, so far as the elements concern the body. Respiration he believed took place through the pores existing in the skin, and he regarded the heart, not the brain, as the region of consciousness. This doctrine was in close conformity with that of ancient Egypt and in part persisted even in the writings of the Koan school of medicine and in the works of Plato.[40] Unlike the rationalism in medicine characteristic of the school of Kos, where in the whole collection of writings known as the Corpus Hippokraticum we meet with not a single suggestion of the use of magic, the followers of Empedokles still clung to ideas of a superstitious nature. Against this attitude we read the protest of Hippokrates in his work on the "Sacred Disease" where he speaks of "magicians and purifiers and charlatans and quacks who profess to be very religious." And Hippokrates adds, "if they profess to know how to bring down the moon and darken the sun, and induce storms and fine weather, and rains and droughts, and make the sea and land unproductive, and so forth,—whether they arrogate this power as being derived from mysteries or any other knowledge or consideration, they appear to me to practise impiety, and either to fancy that there are no gods, or, if there are, that they have no ability to ward off the greatest evils." As Empedokles is the most important of those who preceded Hippokrates in the art of medicine, we may be pardoned for giving the following quotations characteristic of his works:—

"Thus do all things draw breath and breathe it out again. All have bloodless tubes of flesh extended over the surface of their bodies and at the mouths of these the outermost surface of the skin is perforated over with pores closely packed together so as to keep in the blood, while a free passage is cut for the air to pass.

"Even so when the thin blood that surges through the limbs rushes backwards to the interior, straightway the stream of air comes in with a rushing swell, but when the blood returns the air breathes out again in equal quantity.

"The heart dwelling in the sea of blood that runs in opposite directions where chiefly is what men call thought; for the blood around the heart is the thought of men.

"And thou shalt learn all the drugs that are a defence against ills and old age, since for thee alone will I accomplish all these. Thou shalt arrest the violence of the weariless winds that arise and sweep the earth; and again when thou so desirest thou shalt bring back their blasts with a rush. Thou shalt cause for man a seasonable drought after the dark rains and again thou shalt change the summer drought for streams that feed the trees as they pour down from the sky. Thou shalt bring back from Hades the life of a dead man.

"Straightway whenever I enter with these in my train both men and women, into the flourishing towns, is reverence done me; they go after me in countless throngs asking of me what is the way to gain; some by the grievous pangs of all manner of sickness beg to hear from me the word of healing."[41]

Secondly, with regard to the temples of Asklepios. It is doubtful whether the philosopher-physicians regularly engaged in the practice of healing, a pursuit which they would probably have treated with some disdain. The shrines of Asklepios, however, must have derived no inconsiderable part of their revenue and reputation from the success with which benefit was sought by followers of the god. The origin of Asklepios is shrouded in obscurity, but later opinion in Greece attributed his birthplace to Epidaurus, a town of the Peleponnese on the opposite side of the Bay of Ægina from Athens, sometimes distinguished as the "Sacred Epidaurus." At all events it is certain that the cult of Asklepios as a healer originated from Epidaurus. Out of this temple his worship passed to other places, so that no less than 320 of his shrines were scattered throughout the Grecian world.[42] Almost all of these were places of healing, though the most famous were situated at Trikke, Kos and Epidaurus. Pergamus, the city famous six centuries later as the place of Galen's birth, held a temple of Asklepios which became a favorite resort in after times, and in Athens there is at the foot of the Acropolis a ruined shrine supposed to have been a branch of that in Epidaurus. From its proximity to Athens, the commercial advantages of its position, and the fame of its Asklepian temple, Epidaurus enjoyed no small importance. About five miles from the city stood the temple, in a beautiful valley amidst the mountains, and here the festival in honor of Asklepios was celebrated with sports every fourth year, nine days after the Isthmian games at Corinth. In the sacred enclosure there were temples of Asklepios and Artemis with, some distance off, upon the slopes of Mount Kynortion, a temple erected to Maleatean Apollo. Upon the lower slopes of this mountain stood an open-air theatre capable of holding 12,000 persons on its marble benches, while there was, immediately outside the temple precincts, a stadium for 20,000 spectators in which the athletic games took place.[43] The element of pleasure was therefore not wanting in a visit to Epidaurus, and we can well understand how the return to health of the convalescent was quickened or the self-centred thoughts of the hypochondriac were distracted as he sat in the beautiful theatre drinking in the brilliant, fragrant air of Greece, with the olive clad slopes and the sparkling marble temples stretching before his gaze. By night the sick person spread his pallet within the temple precincts, hoping that in a dream the god would reveal to him the method of his cure, and during the day-time he presented his oblations at the shrine or sat in marble shelters protected from the wind and attended by the priests and priestesses, or even—though this was considered a peculiar honor—he might be caressed by some of the large snakes or dogs held sacred to the god. Outside the temple precincts stood numerous hostels and, at all events in Roman times, magnificent baths designed for the use both of the diseased and healthy, and a hospital where the dying might pass away in peace. Pausanias, who wrote a description of the temple at a later period, tells us that "tablets stood within the enclosure. There used to be more of them. In my time six were left. On these tablets are engraved the names of men and women who have been treated by Asklepios, together with the disease from which they suffered, and the manner of the cure. The inscriptions are in the Doric dialect."[44] As to the nature of the cures recorded on these tablets, the inscriptions gave sometimes a somewhat ludicrous account; for example: "A man had his toe healed by a serpent. He was suffering dreadfully from a malignant sore in his toe when the servants of the temple took him outside and set him on a seat. When sleep came upon him a snake issued from the abaton and healed the toe with its tongue and thereafter went back to the abaton. When the patient woke up and saw that he was healed, he said that he had had a dream that a beautiful youth had put a drug upon his toe." * * * * "Heraieus of Mytilene. He had no hair on his head but an abundant growth on his cheeks. He was ashamed because it made him an object of laughter. He fell asleep and the god by anointing his head with some drug succeeded in producing hair thereon."

These records of the cures were very ancient and by the time of Hippokrates the healing of the temples had come to be an object of mirth and sarcasm, as we see from the humorous account given in the Plutus of Aristophanes where the God of Wealth, in order that he may distribute favors more justly, is cured of his blindness by a visit to the shrine at

Athens.[45] Yet in later days when faith in the anthropomorphic gods of Greece was dead, the healing of the temple still continued, for men shared the belief of that traveler from Sidon with whom Pausanias met and conversed in the temple grounds, that "Apollo was the sunshine and Asklepios the fresh air."

With regard to purely medical treatment, Hippokrates was, as Celsus stated, the first person of importance to separate medicine from philosophy, and accordingly a consideration of the third class of medical practitioners, who bound themselves together at first in families to which medical traditions were rigorously confined, and afterwards in guilds to which strangers were admitted on the terms stated in the Hippokratic oath, is beyond the scope of the present article. These Alklepiad guilds, which developed later into the medical schools of ancient Greece, originated for the most part in places where shrines of Asklepios had been established, *e. g.*, at Kos and Knidos. It must, however, be remembered that the physicians were quite distinct from priests, just as they were later separate from the philosophers.

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Die ältesten chirurgischen Instrumente.

Von

John D. Comrie,
M. A., B. Sc., M. B., F. R. C. P. E., F. S. A., Lecturer on the History of Medicine in the University of Edinburgh;
Assistant Pathologist in the Royal Edinburgh Infirmary.

(Hierzu Tafel VI.)

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(Hierzu Tafel VI.)

Die nachstehenden Zeilen geben eine kurze Beschreibung dreier Messer, die in der Nähe von Theben in Oberägypten gefunden worden sind und für die ältesten chirurgischen Instrumente gelten, die uns erhalten sind. Sie sind daher besonders interessant; auch deshalb, weil uns bis jetzt keine Kunde sonst von anderen chirurgischen Werkzeugen vorliegt, die Schienen ausgenommen, die ELLIOT SMITH und WOOD JONES aufgefunden und beschrieben haben.[1]) Während einige von diesen Schienen sehr primitiv sind und etwa aus der Zeit der V. Dynastie stammen, haben wir guten Grund zu der Annahme, daß die hier behandelten Messer gemacht und gebraucht wurden in der Blütezeit der ägyptischen Macht, als die technischen und besonders metallurgischen Künste auf einer sehr hohen Stufe standen, d. h. in der Zeit der XVIII. Dynastie.[2])

Die Messer wurden in der Wüste nicht weit von Luksor im Frühjahr 1886 Mr. D. C. ROBERTSON von einem Araber zum Kauf angeboten. Dieser sagte, sie seien in einem irdenen Gefäße, zusammen mit einigen anderen Instrumenten, in einem Grabe in der Umgegend von Theben gefunden worden. Auch diese anderen Geräte bot der Araber zum Kauf an; es befanden sich darunter verschiedene Sonden und andere Instrumente aus Bronze oder Kupfer, die nach ROBERTSONS Beschreibung der großen Zange gleichen, die man in den Schaufenstern der modernen Mechaniker für chirurgische Instrumente hängen sieht. Leider hat Mr. ROBERTSON weder den irdenen Behälter, noch die anderen Instrumente gekauft; er nahm nur die Messer wegen ihrer sehr zierlichen Form und ein

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[1]) ELLIOT SMITH, „The Most Ancient Splints", *British Medical Journal,* London, March 28, 1908; auch *The Archaeological Survey of Nubia Bulletins*, Nr. 1 und 2, Kairo 1908.

[2]) Siehe BREASTED, *A History of Egypt from the Earliest Times*, London 1906, Seite 93.

Paar Nadeln. Er hat sie später Herrn Dr. J. O. Affleck, ihrem gegenwärtigen Besitzer geschenkt, der sie freundlichst zur näheren Beschreibung zur Verfügung gestellt hat.

Es sind drei Messer von verschiedener Gestalt. Wir nennen sie der Einfachheit halber *A*, *B* und *C*. Die Klingen sind bei allen lang, dünn, schmal und spitz zulaufend. Bei *A*, dem größten Exemplare, ist sie ein klein wenig nach rückwärts gebogen, während die der beiden anderen gerade sind. Der Griff hat bei allen die Gestalt eines Gänsehalses mit Kopf so gebogen, daß man bei *A* bequem drei, bei den beiden anderen zwei Finger durch die Krümmung stecken kann. Der Gänsekopf ist sehr gut geformt, Schnabel und Augen sehr geschickt und deutlich gearbeitet.

Das zweite Messer, *B*, besteht aus einer hellfarbigen Kupferlegierung und ist ein wenig zerfressen. *A* und *C* sind so gleichförmig mit einer Schicht grünen Kupferkarbonats bedeckt, daß es schwer zu sagen ist, ob sie aus Kupfer oder ebenfalls aus einer Legierung bestehen.

Die Maße der drei Messer sind folgende:

	A	*B*	*C*
Ganze Länge	27,2 cm	22,0 cm	17,3 cm
Länge der Schneide	20,5 „	17,3 „	12,7 „
Größte Breite der Klinge	1,9 „	1,6 „	1,4 „
Größte Stärke der Klinge	3,0 mm	1,5 mm	2,0 mm
Stärke des Griffes	3,5 „	3,0 „	3,0 „

Was das Alter der Messer anlangt, so sind wir in der glücklichen Lage, es mit ziemlicher Genauigkeit angeben zu können. Sowohl die Gegend, wo sie gefunden wurden, als die Verzierung der Griffe mit Gänseköpfen, weisen in die Zeit der XVIII. Dynastie. Rev. Professor A. H. Sayce, der sie unmittelbar nach dem Ankauf gesehen hat und mit der Gegend, in der sie gefunden sind, vertraut ist, sagt, „sie seien in einem Grabe der XVIII. Dynastie (etwa 1500 v. Chr.) gefunden". Dr. E. A. Wallis Budge, der Konservator der ägyptischen und assyrischen Altertümer im Britischen Museum, hat eine photographische Wiedergabe der Messer geprüft, und, obwohl er seine Meinung sehr vorsichtig ausdrückt, gibt er doch zu, daß sie wohl in diese Periode gehören mögen. Es ist in diesem Zusammenhange interessant zu beachten, daß in dem Papyrus von Ani (Das Totenbuch) der Gott Ra dargestellt ist, wie er in Katzengestalt der Schlange der Finsternis den Kopf abschneidet, und zwar mit einem Messer, dessen Gestalt fast identisch ist mit der des größten der drei.[1]) Dieser Papyrus stammt aus der Zeit von 1500 bis 1400 v. Chr., d. h. gerade aus der nämlichen Periode, zu der unsere drei Messer vermutlich gehören.

Was den Gebrauch dieser Messer anlangt, so ergeben die äußeren Umstände der Auffindung zusammen mit anderen Instrumenten, die offenbar chirurgischen Zwecken dienten, auf den ersten Blick die Wahrscheinlichkeit, daß sie zu Operationen am menschlichen Körper gebraucht wurden. Leider läßt sich nichts mit Gewißheit über die Persönlichkeit sagen, in deren Grabe sie gefunden worden sind. Wenn zugleich mit ihnen irgendein Papyrus aufgefunden wäre, wäre es wohl möglich, nachzuweisen, daß sie das Eigentum eines Arztes des Neuen Reiches waren, dem sie mit ins Grab gelegt worden sind, damit sein „Ka" seine Heilkraft auch auf andere Schatten in der Unterwelt ausüben könne. So wie die Dinge liegen, können wir nur vermuten, daß dies wahrscheinlich der Fall war.

Ohne weiteres kann man aber sagen, daß sie unmöglich gottesdienstlichen Zwecken (beim Opfern) gedient haben können, auch nicht zum Öffnen von Leichen als den ersten Schritt zur Einbalsamierung. Die Ägypter waren in allem, was ihr religiöses Ritual betraf, äußerst konservativ, und für jenen Zweck hatte man seit unvordenklichen Zeiten Feuersteinmesser gebraucht, die noch üblich waren zu der Zeit, als Herodot nach Ägypten kam, d. h. ungefähr 1000 Jahre nach der Periode aus der unsere drei Messer stammen.[2]) Vergleiche hierzu auch Garstangs „Burial Customs of Ancient Egypt".[3])

Die Gestalt der Messer selbst läßt erkennen, daß sie nur zu langen Schnitten gebraucht wurden. Für irgendwelchen häuslichen Gebrauch wären sie sehr wenig geeignet gewesen. Sobald man sie beim Griffe anfaßt, fühlt man, daß sie sich zum Schneiden von Fleisch nicht eignen, und daß es ganz unmöglich gewesen wäre, Geflügel damit zu zerlegen, weil man mit den durch den gebogenen Griff geschobenen Fingern keinen Hebeldruck ausüben kann. In dieser Hinsicht unterscheiden sie sich vollkommen von den langgriffigen Tischmessern wie wir sie heute brauchen. Sie würden sich aber ausgezeichnet für einige von den Operationen eignen, die im Papyrus Ebers aufgezählt sind.[1]) Dieser Papyrus wurde bekanntlich in der Nähe von Theben gefunden, und man nimmt an, daß er zusammengestellt ist aus schon vorher existierenden Verzeichnissen von Heilmitteln etwa aus derselben Zeit, aus der unsere Messer stammen. Zu den dort aufgeführten Operationen (z. B. S. CVI, CVII) gehört die Entfernung von Tumoren im Nacken, von Fettumoren und Gefäßtumoren, entweder mit dem Messer allein oder mit Messer und Ätzung.

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[1]) *The Book of the Dead. The Papyrus of Ani*, herausgegeben von dem Britischen Museum, Seite 10, Kap. XVII (vgl. unsere Abbildung, Tafel VI, Abb. *D*, nach einer Originalphotographie hergestellt).

[2]) Herodot, II, 86.

[3]) Garstang, *Burial Customs of Ancient Egypt*, London 1907, Seite 106 und 107.

Es wird uns nicht berichtet, daß die Ärzte im alten Ägypten Glieder amputiert haben, und da dem ägyptischen Empfinden jede Verstümmelung des Körpers zuwider war, so ist es unwahrscheinlich, daß überhaupt Glieder entfernt wurden, außer wenn sie infolge von Unfall so zerstört oder so brandig geworden waren, daß jedes beliebige scharfe Instrument für diesen Zweck genügt hätte. Aus diesen Gründen können wir daher nicht annehmen, daß unsere Messer zur Amputation von Gliedern bestimmt waren. Dagegen mögen sie zu Einschnitten in die Haut und zur Befreiung der obengenannten Tumoren von ihren Verbindungen mit der Umgebung sehr brauchbar gewesen sein. Ebenso könnten die beiden kleineren Messer bei der Öffnung von Abszessen ausgezeichnete Dienste leisten.

Erklärung der Figuren.

1. Die drei Messer *A*, *B* und *C* (zwei Drittel wirklicher Größe).

2. Szene aus dem „Papyrus des Ani". Eine Katze im Vordergrunde vor einem Perseabaume im Begriffe, den Kopf einer Schlange abzuschneiden, wodurch der sich erhebende Sonnengott Ra dargestellt wird, der den Drachen der Finsternis erschlägt. (Wirkliche Größe.)

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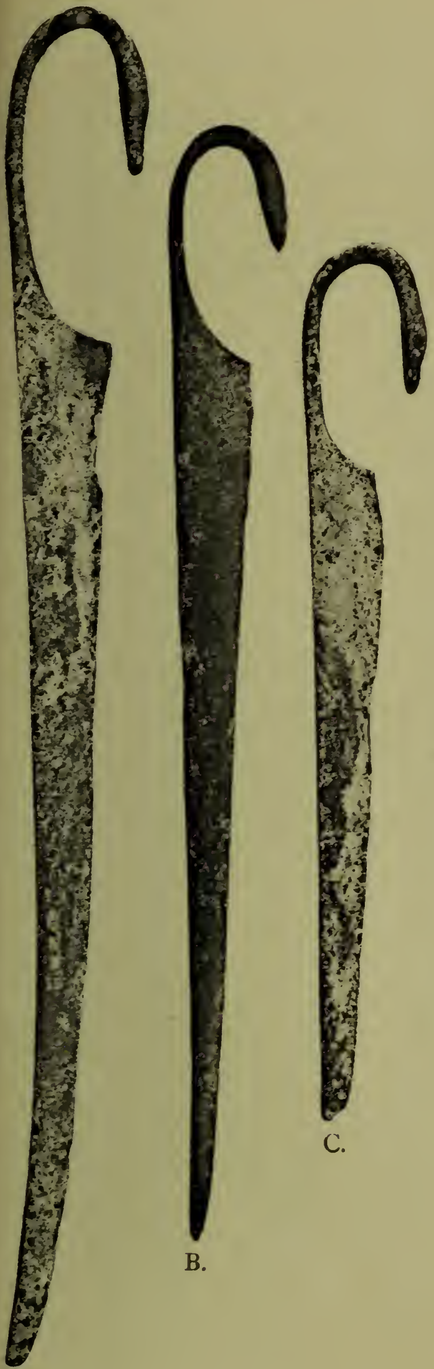
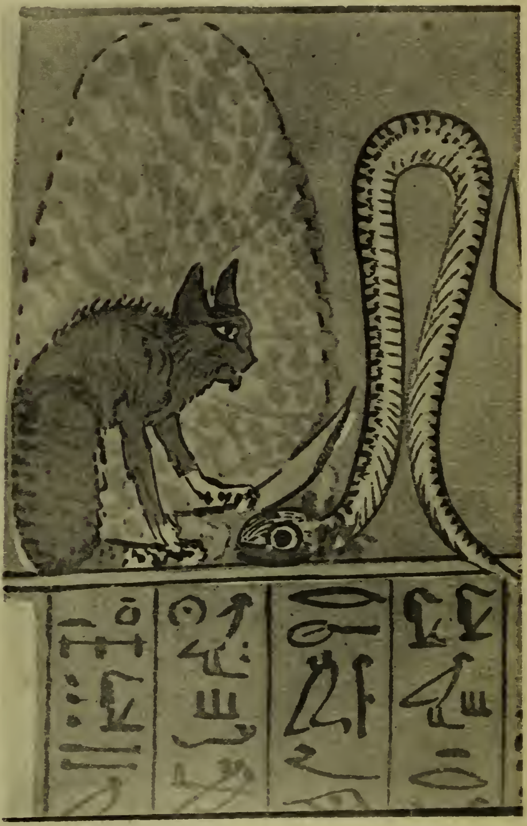
[1]) *Papyros Ebers, das älteste Buch über Heilkunde, aus dem Ägyptischen zum erstenmal vollständig übersetzt*, von Dr. med. H. JOACHIM, Berlin 1890, Seite 190 und 191.



C.

B.

A.



D.

D. Gott Ra schneidet der Schlange der Finsternis den Kopf ab.

A – C. Messer aus der Zeit der 18. Dynastie.